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Number 2

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Mariners Weather Log

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Mariners Weather Log

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Front Cover: This NOAA, Very High Resolution Radiometer (VHRR) image of hurricane Iwa was taken at 0015 November 24. Iwa was near maximum intensity at this time as it swept close to Niihau and later within 25 mi of coast of Kauai.

ARTICLES
63 Hurricane Iwa
67 Eastern North Pacific Tropical Cyclones, 1982
77 Central North Pacific Tropical Cyclones, 1982

MARINE OBSERVATIONS PROGRAM
81 Mariners Weather Log (MWL) Hogs
81 More Observations--Better Forecasts
81 Letters, Compliments, Comments, and Complaints
81 The Good Old Days
81 Present and Old Code Format Compared
81 Ship's Weather Observations-NOAA Form 72-1A
82 The Heading Block
82 Ship's Address Block
82 New Form Designs
82 Filling in the Forms
82 Form 72-1A Ship's Weather Observations
83 Somebody Goofed

TIPS TO THE RADIO OFFICER
84 WWV Weather Segment, Back on the Air
84 Revised Marine Forecast Areas
85 Ship's Weather Observations, NOAA Form 72-1A

THE EDITORS DESK
85 Heavy Arctic Haze
86 Bill Proposed to Permit Fees For Coast Guard Service
86 East Coast Storm Probes
86 Bering Sea Ice Studies
87 Letter to the Editor-Sea Smoke

MARINE WEATHER REVIEW-October, November, December 1982
88 North Atlantic Weather Log
97 North Pacific Weather Log
106 Hurricane Alley
110 Principal Track of Centers of Cyclones at Sea Level
116 North Atlantic Selected Gale and Wave Observations
118 North Pacific Selected Gale and Wave Observations
122 U.S. Cooperative Ship Weather Reports
123 U.S. NDBC Climatological Data

TROPICAL CYCLONE WEATHER REPORTS
129 Letter from the National Weather Service Administrator
130 General Instructions

Routing
Master _____

Observing Officers
_____
_____
_____

Radio Officer _____

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The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 1,1985.

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Mariners Weather Log

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HURRICANE IWA

Hans E. Rosendal
National Weather Service Forecast Office, NOAA
Honolulu, Hawaii

During the afternoon and evening of November 23, 1982 hurricane Iwa swept northward out of the tropical Central Pacific and lashed the Hawaiian Islands of Niihau, Kauai, and Oahu with high winds and damaging surf (fig. 1). This was the first hurricane to seriously affect the Hawaiian Islands for nearly a quarter of a century, and it served as a reminder to the Islands' residents that hurricanes can and do on rare occasions cause a serious impact.

The last previous tropical cyclone to cause major damage within the Hawaiian chain was hurricane Dot, which moved across the island of Kauai in August of 1959. Dot was a more typical midseason hurricane of the kind that forms near the west coast of Mexico and moves westward across the Central Pacific during the months of July, August, and September. In an average season during these months several tropical storms or hurricanes pass near the Hawaiian Islands, usually just south of the Big Island. As a rule they stay far enough offshore to cause only some high surf or a few heavy showers as they move by the Islands. The large cone-shaped volcanos of the Big Island and Maui, extending up to 14,000 ft through much of the earth's lower atmosphere, tend to deflect approaching storms to an extent which is not entirely known. Also, the obstacles of the Islands in the basic trade wind flow induce a trough in the easterlies to the lee or just west of the Islands. It is therefore quite common for tropical storms or huricanes as they move

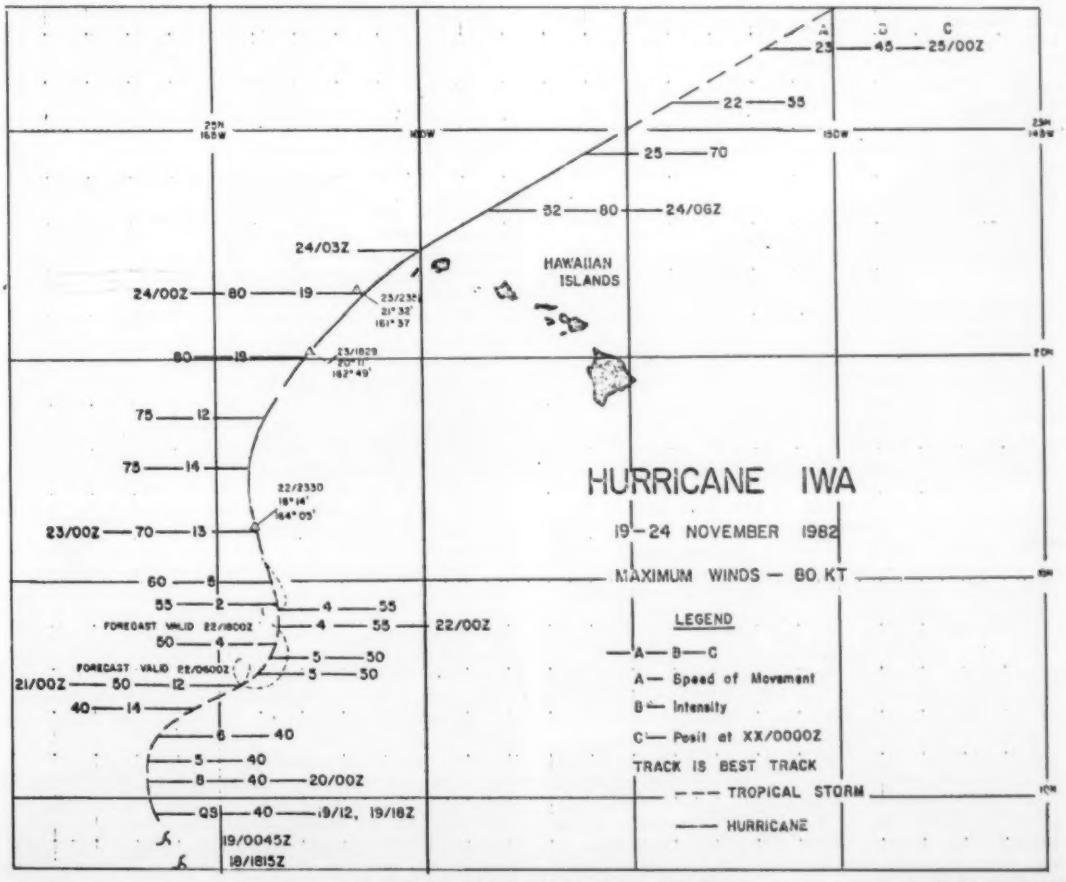

Figure 1.— The track of hurricane Iwa.

past the Islands to make a slight northwestward bend in their tracks as they move to the lee of the Big Island. This tendency for a bend in the tracks northwestward makes Kauai a little more vulnerable to being struck by westward-moving midseason storms such as Dot.

Hurricane Iwa, however, was a late-season tropical cyclone. These storms usually follow somewhat different tracks. In November, the sea-surface temperatures of the tropical oceans as far north as latitude 15°N may still be quite warm, near 28°C over large areas, while the upper flow is starting to become quite winterlike to the north. This means that a tropical cyclone may still have the low-level moisture, instability, and upper divergence needed for development. Once the development has taken place, the strong upper flow may reach far south into the Tropics to move the cyclone quickly northward to higher latitudes. The Hawaiian region is not particularly known for frequent late-season development, though during the last 100 yr or so there have been enough cases in the region to warrant a cautious look southward of the Islands for possible development.

The climatology of the incidence and tracks of early historic storms in the Hawaiian Islands region is not entirely complete, and there may be the problem of determining whether a storm event late in the calendar year was a tropical cyclone or not. However, at least two tropical cyclones, one of November 17-20, 1874, and the other of November 26 - December 4, 1904, seem to fit this particular pattern of moving in from the south. In more recent years, hurricane Nina of November 29 - December 7, 1957, was the latest such case before Iwa.

We shall return to Nina shortly, but first we will point out that this peculiar problem of rapid late-season development and generally northward or northeastward movement out of the deep Tropics into the latitude band of 20°N to 25°N also occurs in rare cases, but still significantly often enough to cause concern in other parts of the world. Thus, for example, western Cuba and southern Florida have been struck severely by late season hurricanes moving out of the western Caribbean. Likewise, the west coast of Mexico from Acapulco to Mazatlan on occasion has experienced the fury of intense November hurricanes moving in rapidly from the south, often with little or no warning in the days before the satellite. The entire northern shorelines of the Bay of Bengal along the coast of Bangladesh is where we find the most frequent occurrence of this phenomenon of intense, late-season tropical cyclones moving northward and inland with devastating results.

As a curious coincidence, hurricane Nina, probably the storm of record most similar to Iwa, affected the Hawaiian Islands almost exactly to the date 25-yr earlier in late November and early December 1957. Nina and Iwa both formed near Palmyra Island (6°N, 162°W) and from there moved slowly northward while gaining hurricane strength. Nina's path followed roughly the longitude line of 161°W, while Iwa, a little farther west, moved along 164°W. About 150 mi southwest of Kauai, Nina made a sharp turn westward which spared the Hawaiian Islands the worst of her fury. Nina, nevertheless, did come close enough to cause considerable surf damage along the south shores of Kauai, and the fringes of her circulation extended in over Kauai and Oahu causing some wind and heavy rain damages to portions of these islands.

Hurricane Iwa (pronounced EE-VAH and the Hawaiian name for the Frigate Bird) did not turn on a path westward away from the Islands as Nina did. Rather, Iwa, after having been nearly stationary or drifting very sowly northward in the area near 12°N, 164°W for 24 to 48 hr on November 21 and 22, all of a sudden made a leap northward and northeastward toward Kauai. The rapidly accelerating forward motion carried the center of Iwa north-northeastward close to Niihau and within about 25 mi of the northwest coast of Kauai at 1700 HST on November 23 (fig. 2).

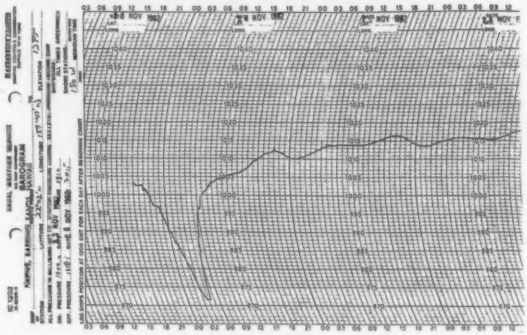

Figure 2.-- The barograph trace during hurricane Iwa at Barking Sands, HI on the west coast of Kauai.

Hurricane Iwa at the time was moving with a forward speed of 30 to 40 mi/hr past Kauai with maximum sustained winds estimated at 80 to 90 mi/hr in a small area near the center and gusts as high as 100 to 120 mi/hr.

The very sudden forward acceleration of hurricane Iwa probably added to the severity of the winds in the north "dangerous semicircle" extending over Kauai and Oahu. It also likely caused the energy of the swell waves moving with or out ahead of the storm to become more concentrated in time and space. On the other hand, the forward acceleration of the storm caused the severe wind conditions to be of relatively short duration at any one point and resulted in the rainfall accumulation over the Islands being unusually light.

Surf and water damage to shoreline property was very extensive along the entire south shore of Kauai. Most of the damage was concentrated in the Poipu area, where exposed luxury hotels and condominium property within several hundred feet of the ocean were flattened or severely damaged. A number of small vessels were sunk or grounded at Nawiliwili Harbor near Lihue and at Port Allen on the south coast. On Oahu surf and water damage, along with the wind damage, severely affected the Waianae communities from Nanakuli to Makaha. Some damage also occurred to shoreline property in the Kahala area below the famous Diamond Head Crater. On Kauai, as well as Oahu, damage was heavier where no protective reefs were present offshore. Lesser surf damage occurred on the other islands from Lanai to Big Island at

Figure 3.-- Few boats in Nawiliwili harbor on Kauai survived undamaged. Photo courtesy of the Honolulu Advertiser.

locations where the southwesterly swell battered coastal installations. High water washed sand into some of Waikiki's streets and flooded cars in basement parking areas. The height of the actual storm surge with hurricane Iwa is difficult to estimate. It probably reached to about 3 ft near Waikiki, 5 ft along the Waianae coast, and 6

Figure 5.-- Damage along the Nanakuli coast of Oahu. Sand is piled along the highway like snow in northern climates. Photos by Greg Sandorn, U. of Hawaii Marine Option Program.

Figure 4.-- These photographs from Hurricane Iwa Hits Hawaii published by the Honolulu Advertiser illustrates the damage on Kauai.

to 8 ft along the south coast of Kauai (figs. 3, 4, and 5).

Wind damage on Kauai was extensive and showed relatively little variability over the island. On Oahu local terrain features affected the flow very strongly, and there was a distinct lessening of damage eastward and southward across the island away from the center of the hurricane. The pockets of heavy wind damage on Oahu usually coincided with locations where winds from southeast through southwest directions blow downslope from off the Waianae and Koolau ranges. Strongest winds at Honolulu International Airport occurred at 1845 HST during the passage of a convergence line or squall line which separated south-southeast winds ahead of it from south-southwest winds behind it. The fastest 1-min average windspeed registered 46 mi/hr with a peak gust at 81 mi/hr out of the south-southwest. Much of the wind damage on Oahu occurred as this north-south-oriented line of showers moved across the island between about 1800 and 1930 HST. At Lihue Airport the fastest 1-min average windspeed was 65 mi/hr out of the south at 1733 HST. Gusts to 85 mi/hr were clocked at 1703 HST and again at 1737 HST. A number of small aircraft sustained damage at both Lihue and Honolulu. At Honolulu International Airport an old DC-3 aircraft was rolled across the field by the strong winds at the height of the storm. Within the airport terminal complex several passengers suffered cuts from flying glass as a large window pane shattered during the gusty winds.

Rainfall over the Islands accompanying hurricane Iwa was unusually light. A hurricane of similar strength easily could have deposited as much as 10 to 15 in. in less than 12 hr over portions of the Islands with destructive flooding the result. The very fast forward movement of hurrricane Iwa, as it swept by the Islands, appears to be the main reason for this lack of rainfall. Also at the time Iwa was in the process of undergoing transformation from a tropical, warm core system into an extratropical, cold-core low-pressure area. During this transformation process, the convective cloudiness around the center tends to become more asymmetrically distributed. As seen from the satellite pictures, Iwa was starting to take on some of these extratropical features of the "open wave" type frontal low-pressure system with a "flatter" central pressure distribution and with much of the heavy precipitation displaced to the north of the center out over the open waters north of Kauai.

In spite of the furious winds and destructive waves accompanying a moderate hurricane like Iwa, no fatalities occurred on land. One seaman aboard a Navy destroyer leaving Pearl Harbor ahead of the storm was killed by heavy sea and several others were injured. Otherwise, injuries were mostly minor. At the height of the storm 5,800 people were evacuated from shoreline areas of Kauai and placed in temporary shelters. Total damage losses, public as well as private, were estimated near $200 million, of which $150 million occurred on Kauai and $50 million on Oahu. This compares with losses of $7 million in 1959 associated with hurricane Dot's passage 23 yr ago. Within the agricultural sector on Kauai and Oahu, damage to banana and papaya was extensive, and large sugar cane acreage was set back severely as leaves were stripped by the strong winds. Sugar growers also sustained damage to production facilities, equipment, and buildings.

Utilities on Kauai and Oahu were hard hit. The electric power distribution system suffered severely, and many customers were without electric power for more than a week. There were also telephone service interruptions with the outside world, mostly of a very temporary nature, as both satellite and cable links were severed. The local telephone service, however, stood up well during the storm. All television stations were off the air much of the night, and only one or two radio stations were able to continue to broadcast. The lack of electric power also affected the local utilities' ability to pump water and to produce synthetic natural gas. The tourist industry on Kauai suffered badly in the aftermath of the storm as many visitors were anxious to leave for other islands or for home.

In view of the large amount of destruction by wind and waves, it seems miraculous that injuries and loss of life were so small. Adequate warnings followed by a good public response and protective measures taken by civil defense and other agencies no doubt all contributed. Iwa thus served as a reminder that hurricanes can and do on rare occasions seriously affect the Hawaiian Islands. Iwa lacked the very dangerous and damaging aspects of excessive rainfall over the mountainous Islands. Damages from wind and storm surges and high water could have been much worse had Iwa moved on a path somewhat closer to the densely populated Oahu. The increased population of the Hawaiian Islands in recent years and the often carefree construction in exposed beach front areas or along valley bottom lands subject to flooding mean that there must be a continued effort to focus public awareness on the dangers of these storms. The next one may not wait 25 yr.

Mariners Weather Log

EASTERN NORTH PACIFIC TROPICAL CYCLONES, 1982

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National Weather Service, NOAA
Redwood City, CA

The 1982 eastern North Pacific tropical cyclone season began on May 20 and ended on October 26. Spanning 160 days, the season was 7 days longer than the 1981 season and 17 days longer than the 1980 season. The 1982 season, with 11 hurricanes, 8 tropical storms, and 7 tropical depressions, was one of the most active on record. The number of named storms, 19, was a 32-percent increase over the previous 16-yr average of 14.4. The increase in the number of cyclones reaching hurricane strength was even higher at 49 percent. The number of hours during which there were tropical storms in 1982 totaled 1,044 compared to 858 in 1981 and 476 in 1980. Hurricane hours totaled 774 compared to 432 in 1981 and 586 in 1980. The highest sustained windspeed in 1982 was 125 kn. Four of the eleven hurricanes in 1982 had sustained winds equal to or in excess of 100 kn compared to one out of eight in 1981. Table 1 shows the monthly distribution of 1982 tropical cyclone activity, and tables 2 and 3 compare this activity with that of recent years. The 1966-82 period was chosen for comparison since it probably includes all tropical cyclone activity in the area due to satellite coverage since 1966. Prior to that time some tropical cyclone activity went undetected due to the sparsity of data in the Tropics. A summary of the important features of the 1982 season is given in table 4. Cyclone tracks west to 140°W are shown in figures 6, 7, and 8. The dates on the track charts only include the times east of longitude 140°W. The complete dates for each storm are included with the heading of the individual writeups.

The Eastern Pacific Hurricane Center issued 509 tropical cyclone advisories during the 1982 season, 200 more than in 1981, and 239 more than in 1980. Advisories were issued four times daily on a regularly scheduled basis for cyclone positions at 0000, 0600, 1200, and 1800. Six of the 1982 tropical cyclones moved across 140°W longitude and into the Central Pacific Hurricane Center's area of responsibility compared to only two in 1981, one in 1980, and none in 1979.

Reports of damage and/or casualties from eastern North Pacific tropical cyclone activity during the 1982 season were confined to hurricanes Paul and Olivia. Paul, the only cyclone to move onshore during the season, brought strong winds and heavy rains to the north-central coast of western Mexico on September 29. At least 8 people were killed, 24,000 were left homeless, and agricultural losses were estimated near $70 million.

Olivia, although dissipating off the southern California coast, spread moderate to heavy rains northward over much of California resulting in agricultural losses estimated near $325 million.

Although some ships passed close to the centers of tropical cyclone activity and undoubtedly experienced heavy weather and seas, no reports of casualties or damage to ships were received.

The National Satellite Service Field Station,

Table 1.-- Monthly distribution of eastern North Pacific tropical cyclones, 1982.*

	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
Tropical depressions	0	3	3	0	1	0	0	7
Tropical storms	1	1	2	2	1	1	0	8
Hurricanes	0	0	4	3	3	1	0	11
Total	1	4	9	5	5	2	0	26

* Cyclones are ascribed to the month in which they began.

Table 2.-- Frequency of eastern North Pacific tropical storms and hurricanes combined by month and years.*

Year	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
1966	0	1	0	4	6	2	0	13
1967	0	3	4	4	3	3	0	17
1968	0	1	4	8	3	3	0	19
1969	0	0	3	2	4	1	0	10
1970	1	3	6	4	1	2	1	18
1971	1	1	7	4	2	2	1	18
1972	1	0	1	6	2	1	1	12
1973	0	3	4	1	3	1	0	12
1974	1	3	3	6	2	2	0	17
1975	0	2	4	5	3	1	1	16
1976	0	2	4	4	3	1	0	14
1977	1	1	1	1	3	1	0	8
1978	1	3	4	6	2	2	0	18
1979	0	2	2	2	1	2	1	10
1980	0	3	5	2	2	2	0	14
1981	1	1	3	4	2	4	0	15
1982	1	1	6	5	4	2	0	19
Total	8	30	61	68	46	32	5	250
Average	0.5	1.8	3.6	4.0	2.7	1.9	0.3	14.7

* Cyclones are ascribed to the month in which they began.

Table 3.-- Number of eastern North Pacific tropical cyclones reaching hurricane intensity by months and years*

Year	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
1966	0	1	0	4	2	0	0	7
1967	0	1	0	2	1	2	0	6
1968	0	0	0	3	2	1	0	6
1969	0	0	1	1	1	1	0	4
1970	1	0	1	1	0	1	0	4
1971	1	1	5	2	2	1	0	12
1972	1	0	0	6	1	0	0	8
1973	0	1	3	0	2	1	0	7
1974	0	2	2	4	2	1	0	11
1975	0	1	2	3	1	1	0	8
1976	0	2	1	2	3	0	0	8
1977	0	0	1	1	1	1	0	4
1978	1	2	3	4	1	1	0	12
1979	0	1	1	2	1	1	0	6
1980	0	2	2	2	1	0	0	7
1981	0	1	1	3	1	2	0	8
1982	0	0	4	3	3	1	0	11
Total	4	15	27	45	25	15	0	129
Average	0.2	0.9	1.6	2.6	1.5	0.9	0	7.6

* Cyclones are ascribed to the month in which they began.

Table 4.-- Eastern North Pacific tropical cyclones, 1982. All times GMT, latitudes north, longitudes west. HU = hurricane, TS = tropical storm, TD = tropical depression.

Cyclone	Depression	Storm	Hurricane	Storm	Depression	Final Position	Maximum Wind m/s(kt)	From	To
TS Aletta 20-29 May	200000 11.0-104.8	211800 12.8-105.2			271200 14.2-103.1	291200 15.7-102.5	28(055)	230000 14.1-103.8	230600 14.4-103.6
TD Two 31 May-4 Jun	311200 13.4-095.6					041200 15.8-095.0	15(030)	311200 13.4-095.6	011200 13.8-094.4
TD Three 13-15 Jun	130000 08.0-123.5					151200 13.0-123.9	13(025)	130000 08.0-123.5	151200 13.0-123.9
TS Bud 15-17 Jun	151200 12.8-105.2	151800 13.1-105.7			171200 13.4-110.6	171200 13.4-110.6	23(045)	160000 13.3-106.4	170000 13.6-109.2
TD Five 17-19 Jun	170600 13.0-093.9					191200 14.9-096.4	15(030)	171800 13.8-093.4	190000 14.5-095.0
TS Carlotta 1-6 Jul	011200 13.0-107.1	011800 13.6-107.2			050000 20.0-117.0	060000 21.4-118.0	26(050)	031800 17.8-112.8	041200 19.9-116.0
TD Seven 3 Jul	030000 12.8-135.4					031800 14.3-135.4	15(030)	031200 14.1-135.9	031800 14.3-135.4
HU Daniel 7-16 Jul	070000 09.2-098.0	071800 10.1-100.8	091800 12.8-109.3	150600 18.2-133.4		161200* 18.1-140.0	52(100)	110600 14.3-114.3	120600 15.7-117.8
TS Emilia 12-13 Jul	121200 10.0-136.5	121800 10.1-137.8				130000* 10.3-139.2	18(035)	121800 10.1-137.8	130000 10.3-139.2
TD Ten 14 Jul	140000 12.0-111.0					141800 12.0-114.0	15(030)	140000 12.0-111.0	141800 12.0-114.0
TD Eleven 16-17 Jul	160000 10.6-120.1					171800 12.5-123.0	15(030)	160000 10.6-120.1	171800 12.5-123.0
HU Fabio 17-25 Jul	171200 11.2-103.2	180000 11.6-103.8	190600 14.0-105.9	210000 18.5-113.1	221800 19.5-120.1	250600 19.2-130.6	36(070)	191800 15.4-107.4	201200 17.8-110.4
HU Gilma 26-30 Jul	260600 09.4-117.3	261800 10.0-118.7	280600 13.7-125.3			300600* 16.5-139.2	57(110)	291800 15.7-135.8	300000 16.0-137.5
HU Hector 29 Jul-3 Aug	290000 11.3-114.8	291200 11.3-117.2	301800 13.2-122.6	010000 18.2-127.5	021200 20.4-135.0	030600 20.9-138.6	34(065)	301800 13.2-122.6	010000 18.2-127.5
TS Iva 1-8 Aug	010600 11.5-106.8	021800 13.2-111.8			031800 14.9-115.1	080000 15.2-132.5	18(035)	021800 13.2-111.8	031800 14.9-115.1
HU John 2-6 Aug	021200 09.8-123.7	040600 11.5-127.9	051200 11.8-134.6			061200* 12.2-139.9	46(090)	060600 12.2-138.6	061200 12.2-139.9
HU Kristy 8-11 Aug	081800 09.5-123.7	090600 09.7-127.0	100600 10.7-133.5	110000 10.4-137.9		110600* 10.2-139.6	34(065)	100600 10.7-133.5	110000 10.4-137.9
TS Lane 8-15 Aug	081800 09.8-110.0	091200 11.2-114.2			120600 15.5-127.2	150000 18.7-139.6	28(055)	100600 13.2-117.7	110600 15.0-122.5
HU Miriam 30 Aug-4 Sep	300000 12.5-107.5	301800 13.6-111.5	311800 14.8-117.4			041200* 15.4-139.9	39(075)	021200 15.6-127.0	040600 15.8-137.9
HU Norman 9-18 Sep	091800 10.2-109.9	110000 11.9-114.4	130000 14.5-119.1	161200 20.8-121.3	171200 23.2-120.4	181200 25.8-117.8	46(090)	140000 16.0-121.3	150000 17.8-122.3
TD Twentyone 11-12 Sep	110600 13.5-131.4					120000 13.7-133.9	15(030)	110600 13.5-131.4	120000 13.7-133.9
HU Paul 18-22 Sep	181800 11.7-090.0					220000 14.3-096.7	15(030)	181800 11.7-090.0	211800 14.5-095.7
regenerated 24-30 Sep	240000 13.3-104.2	260000 14.8-106.8	271800 16.8-110.4			300600 25.7-109.0	49(095)	291200 21.5-110.2	300600 25.7-109.0
HU Olivia 18-25 Sep	181800 11.3-101.7	190600 12.2-102.1	200600 14.0-104.0	231800 22.3-121.0	241800 27.3-122.9	251800 31.0-121.4	64(125)	211800 17.1-110.0	221200 19.3-114.0
TS Rosa 30 Sep-6 Oct	301800 12.5-095.1	010000 12.6-095.6			031800 14.8-099.9	061800 18.6-105.3	23(045)	021800 13.7-098.7	030600 14.3-099.4
HU Sergio 14-23 Oct	140000 09.1-091.5	140600 09.3-092.4	150000 10.0-095.1	211800 16.8-124.5	230000 17.9-130.6	231800 18.8-133.3	57(110)	171800 13.7-108.6	181200 15.3-111.5
TS Tara 19-26 Oct	191800 09.4-103.3	221200 14.2-117.1			251800 19.7-129.3	260600 21.0-130.3	23(045)	221800 14.7-118.2	251200 19.0-128.5

* Passed to the Central Pacific Hurricane Center (CPHC).

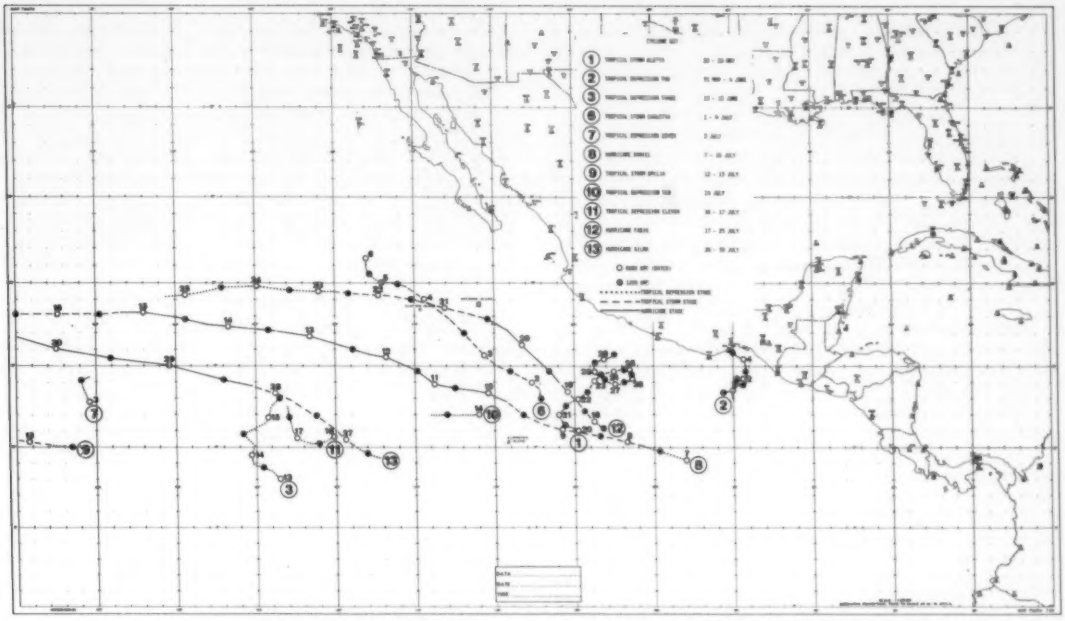


Figure 6.--Tracks of eastern North Pacific tropical cyclones 1-3, 6-13, 1982.

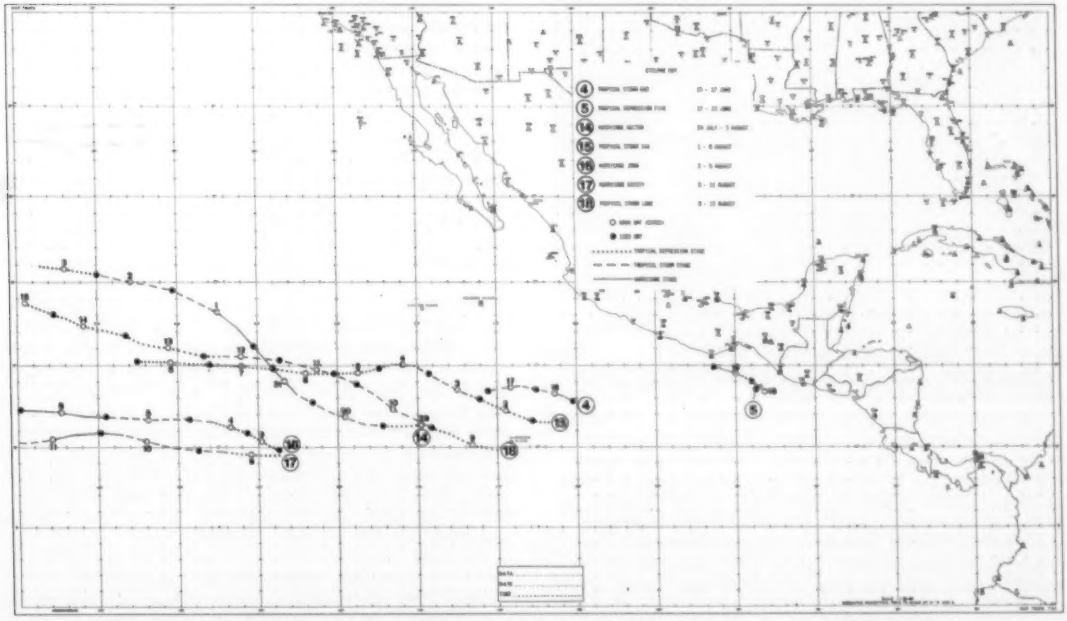


Figure 7.--Tracks of eastern North Pacific tropical cyclones 4, 5, 14-18, 1982.

collocated with the Eastern Pacific Hurricane Center (EPHC), provided excellent satellite coverage during the 1982 season. Visual and infrared satellite imagery were available from the geostationary GOES and polar-orbiting NOAA satellites. The Satellite Image Display System (SIDS) provided continuous surveillance of tropical cyclone activity over the eastern North Pacific during the season. The gridding of satellite imagery was accurate to within a few

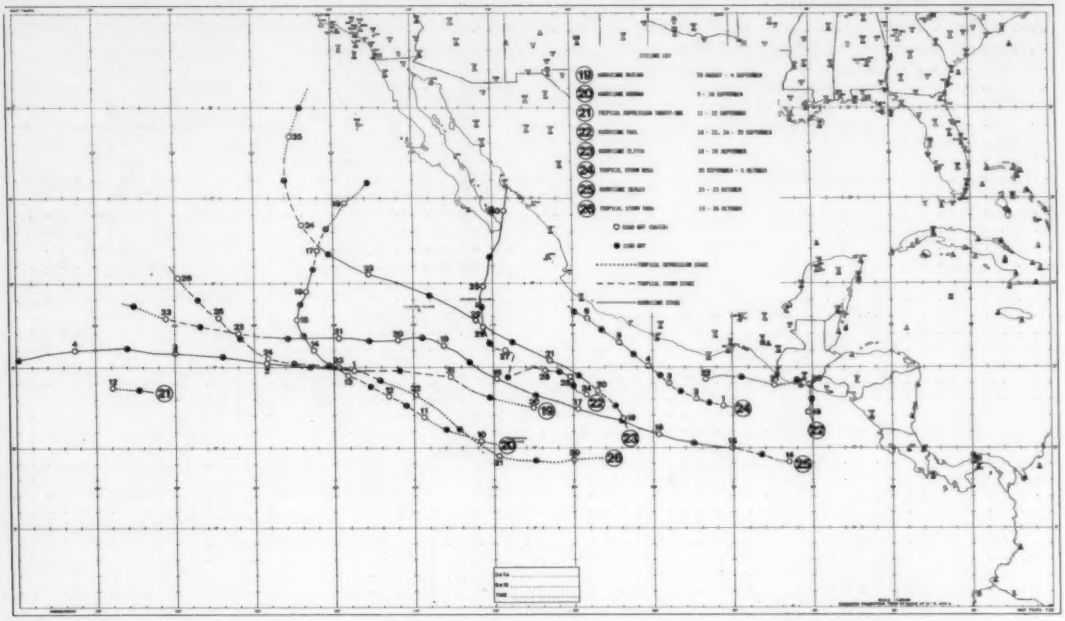


Figure 8.--Tracks of eastern North Pacific tropical cyclones 19-26, 1982.

Table 5.-- Forecast errors*

	Forecast period (hours)		
	24	48	72
EPHC forecasters	270/145(78)	199/313(169)	138/456(246)
EPANALOG	262/169(91)	200/345(186)	140/504(272)
EPHC77	255/163(88)	197/334(180)	138/495(267)
CLIPER	263/152(82)	201/334(180)	140/474(256)
EPHC81	93/150(81)	66/313(169)	44/426(230)

* Number of cases/average error in kilometers(nautical miles).

miles due to the stability of the satellites and easily identifiable landmarks. Enhanced H-curve infrared imagery was especially useful in depicting high-level, cold-core centers. Cyclonic intensity was calculated using the Dvorak technique of satellite analysis.

As hurricane Olivia moved northward off the Baja California coast, NOAA research aircraft from Miami made 90 dropsonde observations over the cyclone in 37 hr of flight time over a 2-day period. These observations were very helpful in defining an upper level ridge of high pressure and the projected movement of the cyclone. No other reconnaissance flights into eastern North Pacific tropical cyclone activity were made during the 1982 season.

Even though satellite imagery continues to improve and is probably one of the most important tools used by tropical forecasters, aircraft, reconnaissance and synoptic ship reports retain their importance as invaluable comparative observations for both the tropical forecaster and satellite meteorologist.

Numerically generated forecast tracks for tropical cyclone activity in the eastern North Pacific were available from the National Hurricane Center during the 1982 season. The forecast tracks included an analog model (EPANALOG), a statistical-synoptic model (EPHC77), a simulated analog model (CLIPER), and a statistical-dynamical model (EPHC81). Table 5 shows the average forecast errors for the 24-, 48-, and 72-hr positions for the Eastern Pacific Hurricane Center forecasters and for each of the numerical models. While the numerical forecasts are independent of each other, the forecasts made by the EPHC forecasters are not independent of the numerical forecasts. The EPHC81 forecasts, although showing the best performance of any of the models during the 1982 season, were run only on 0000 and 1200 input data and were not available on a real-time basis for use in operational EPHC forecasts. New procedures for running the EPHC81 model in 1983 should rectify this problem. Although EPHC forecaster accuracy was better in the 24-hr period than the previous record of 82 mi set in 1978, the overall accuracy though the 24-, 48-, and 72-hr periods, 164 mi, was not as good as the accuracy of 152 mi set in 1978.

TROPICAL STORM ALETTA, MAY 20-29

The 1982 hurricane season opened on May 20 with a weak tropical depression that was to become tropical storm Aletta 2 days later. Satellite imagery first showed a disturbance on the 18th about 432 mi south-southwest of Acapulco. By 0000 on the 20th, satellite data indicated a weak circulation center near 11°N, 104.8°W. During

the next 36 hr the weak depression gathered strength over 30°C water, moved northwestward, and was upgraded to tropical storm Aletta at 1800 on the 21st. Upper level westerlies caused Aletta to recurve northeastward on the 21st. Maximum sustained winds of 55 kn were reached on the 23d as Aletta continued slowly northeastward. On May 25, westerly flow at higher levels near Aletta decreased markedly. The storm slowed, moved in a large anticyclonic loop until the 28th, then finally dissipated at 1200 on the 29th, about 162 mi southwest of Acapulco. Observations sent from the BETELGEUSE were helpful in locating the center of Aletta.

TROPICAL STORM BUD, JUNE 15-17

As the final advisory on tropical depression Three was issued, the next cyclone of the season was developing over 31°C water 400 mi southwest of Acapulco, Mexico. Moving west-northwestward at 6 kn the cyclone intensified rapidly. By 1800 June 15, the winds had increased to 40 kn, and the depression was upgraded to tropical storm Bud near 13.1°N, 105.7°W. Six hours later the storm reached its maximum intensity of 45 kn. The cyclone then turned westward beneath the south side of an upper level high-pressure area centered off the west coast of Mexico. Winds continued at 45 kn through 1800 on the 16th, then began to decrease as the storm moved toward cooler 29°C water. The cargo ship MARINO EXPRESS, 160 mi north of the storm during this period, sent observations helpful in evaluating the cyclone. Turning a little south of west, Bud began to weaken rapidly. He was downgraded to a depression and the final advisory was issued on the cyclone at 1200 June 17 with the center dissipating 200 mi north-northwest of Clipperton Island.

TROPICAL STORM CARLOTTA, JULY 1-6

The sixth tropical cyclone of the season was associated with a wave on the Inter-Tropical Convergence Zone (ITCZ) which crossed Central America on June 26 between 9°N and 12°N. At 1200 it was identified as an area of thunderstorms centered near 11°N, 87°W. This thunderstorm area moved westward at 11 to 14 kn and began to show signs of cyclonic organization by 0600 June 30. The disturbance continued westward over 28°C water, with warmer sea-surface temperatures to the northwest. Advisory number 1 was issued for tropical depression Six at 1200 July 1. Winds were estimated to be 30 kn. The 1000- to 200-mb vertical wind shear was very low near the cyclone, less than 5 kn. Just 6 hr later, at 0000 July 2, Carlotta was upgraded to a tropical storm at 14°N, 107.7°W. With continued northwestward movement, the storm reached its maximum intensity of 50 kn at 1800 on the 3d near 17.8°N, 112.8°W. The sea-surface temperature was greater than 29°C at that location, and the warmest along Carlotta's track. Vertical wind shear continued very light. Southwest flow ahead of an upper level trough near the west coast of the United States was beginning to steer Carlotta northward. In addition, the deep layer vertical wind shear increased to greater than 15 kn at 20°N along the storm's path. Carlotta was downgraded to a tropical depression at 0000 July 5 near 20°N, 117°W, and dissipated 24 hr later. The research ship MELVILLE and cargo ships THOMPSON LYKES, EASTERN MOON, and ANTON CHEKHOV all aided in analyzing and forecasting Carlotta.

HURRICANE DANIEL, JULY 7-22

Hurricane Daniel was a classic eastern Pacific tropical cyclone. It formed near 10°N, 100°W, where most tropical cyclogenesis occurs, moved west-northwestward at about 11 kn out to 130°W, then traveled at an average of 13 kn, almost due west along 18°N into the Central Pacific Hurricane Center (CPHC) area of responsibility. The subtropical ridge remained strong throughout the lifetime of Daniel with an axis to the north along 30°N. Daniel began as a weak depression on July 7. Maximum winds increased steadily as the storm moved over water with surface temperatures near 29°C for several days. Hurricane strength was reached on the 9th, and maximum sustained surface winds of 100 kn were reached on the 11th (fig. 9) and that intensity held for 24 hr. Early on the 12th the storm began to move over cooler water of less than 27°C, and the intensity gradually dropped. Daniel's intensity had dropped to 35 kn when the storm was passed to CPHC on the 16th. Observations from MELVILLE during early stages of the storm and from NISSAN MARU along the track west of 120°W were very helpful in defining winds near the storm.

Figure 9.--Infrared satellite image of tropical depression Ten and hurricane Daniel at 0515 July 14.

TROPICAL STORM EMILIA, JULY 12-15

Tropical storm Emilia, the ninth cyclone of the season, began as a tropical depression near 10°N, 136.5°W at 1200 on July 12. Moving westward, the depression began to intensify rapidly and 6 hr later was upgraded to tropical storm Emilia near 10.1°N, 137.8°W. Figure 10 shows the storm with 35 kn winds at 1815. Hurricane Fabio can be seen 1,200 mi to the east-northeast. Continuing westward, Emilia moved across 140°W longitude and into the CPHC's area of tropical cyclone responsibility at 0330 on the 13th. The

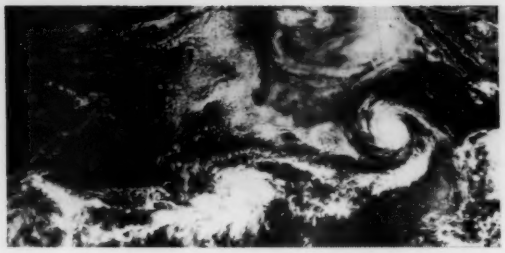


Figure 10.--Tropical storm Emilia with 35-kn winds near 10.1°N, 137.8°W at 1815 July 12. Hurricane Fabio, with a clearly defined eye, can be seen to the east-northeast.

cyclone then turned west-northwestward. Winds near the center increased to a maximum intensity of 55 kn before the storm began to weaken. The final advisory on the cyclone was issued on July 15 with the center dissipating 360 mi southeast of the island of Hawaii.

HURRICANE FABIO JULY 17-25

The second hurricane of the season, Fabio, began as a weak depression on July 17 but rapidly developed to hurricane strength within 48 hr as it moved northwestward. By 1800 on the 19th it peaked in intensity at 70 kn. After reaching 15°N it was steered by flow around the subtropical ridge to the north. Fabio's track was almost due west along 19°N after passing 115°W due to the influences of the ridge to the north. Cooler sea-surface temperatures of less than 26°C west of 120°W resulted in gradual weakening until dissipation occurred near 19.2°N, 130.6°W, at 0600 July 25. Observations from the VOYAGEUR and the VANIL during the first few days of the storm were very helpful in positioning the center and determining the extent of gale-force winds.

HURRICANE GILMA, JULY 26-AUGUST 1

Gilma, the 13th cyclone of the season, began as a depression on July 26. Moving west-northwestward the depression intensified rapidly over 28°C water. By 1800, winds near the center had increased to 35 kn and the depression was upgraded to tropical storm Gilma near 10°N, 118.7°W. A weather report from the NOAA research ship DAVID STARR JORDAN helped to locate the center of the storm. Continuing on a west-northwest track, the storm began to accelerate around the south side of an upper level area of high pressure. By 0600 on the 28th, Gilma's winds had increased to 65 kn, and the storm was upgraded to a hurricane near 13.7°N, 125.3°W. Southeasterly 40-kn winds, reported by the cargo ship VOSTOCHNYY 110 mi east-northeast of the cyclone at 1800, were helpful in pinpointing the hurricane. Gilma continued around the south side of the upper level HIGH. A weather report from the cargo ship CAMBRIDGESHIRE was helpful in tracking the storm to the west. Hector, the next cyclone of the season, was developing as a tropical depression 900 mi to the east-southeast. Winds near the center of Gilma continued to increase, reaching a maximum intensity of 110 kn by 1800 July 29 with the center of the cyclone

Figure 11.--Hurricane Hector near 13.2°N, 122.6°W at 1815 July 30. Also pictured is hurricane Gilma.

near 15.7°N, 135.8°W. Figure 11 shows Gilma with a well-defined eye and winds near 100 kn at 1815 on the 30th near 17°N, 137°W. Hurricane Hector can be seen 1,100 mi to the east-southeast. Gilma's winds began to diminish a few hours after reaching their maximum intensity and were down to 95 kn as the hurricane moved across 140°W longitude and into the CPHC's area of tropical cyclone forecast responsibility at 1000 July 30. After crossing 140°W longitude, Gilma continued to move rapidly westward and weaken. The center dissipated 200 mi southwest of Hawaii.

HURRICANE HECTOR, JULY 29-AUGUST 3

Tropical cyclone Hector developed from a wave on the ITCZ which moved off the Colombian coast on July 23 between latitudes 5°N and 8°N. The associated thunderstorm area moved westward at 20 kn or greater. Rather cool (26-27°C) sea-surface temperatures extended along its track between 101°W and 115°W. The first advisory was issued at 0000 July 29 for tropical depression 14. At this time, a mean upper level HIGH was centered over northern New Mexico with a ridge extending southwestward towards the Hawaiian Islands. A deep layer of easterly winds extended southward from Mexico to the Equator. Twelve hours later, with 35-kn winds, tropical storm Hector turned northwestward and continued to intensify. At 1800 July 30, near 13.2°N, 122.6°W, Hector was upgraded to a hurricane with 65-kn winds. Figure 11 depicts Hectorwhen it first developed an eye. Also visible is an area of strato-cumulus clouds associated with an upper level trough which extended from near the California coast southwestward to an upper level LOW centered near 16°N, 135°W. Increasing vertical wind shear associated with this LOW and cold sea-surface temperatures were contributing factors toward the demise of Hector. Hector continued northwestward as a hurricane and accelerated slowly. At 0000 August 1 near 18.2°N, 127.5°W, Hector began a rapid weakening trend. Sea-surface temperature was down to 24°C and the cold strato-cumulus cloud field noted earlier was being drawn into the circulatio . Hector was downgraded to a tropical storm at 1200 on the 2d near 20.4°N, 135°W. The cargo ship VOSTOCHNYY was helpful in analyzing hurricane Hector.

TROPICAL STORM IVA, AUGUST 1-8

The next cyclone began as a tropical disturbance 250 mi south of Acapulco, Mexico, at 1200

on July 31. Moving west-northwestward over 27°C water, the disturbance intensified slowly and was upgraded to tropical storm Iva 725 mi west-southwest of Acapulco at 1800 August 2. By 1800 on the 3d winds near the center were down to 30 kn and the storm was downgraded to a depression near 14.9°N, 115.1°W. The cyclone was moving slowly in a generally westerly direction. A weather report from the cargo ship CHIBA at 0000 on the 7th helped to locate the depression near 14.9°N, 126°W. The cyclone was moving over colder water and low clouds from the north, feeding into the low-level circulation, further weakened the depression.

HURRICANE JOHN, AUGUST 2-10

Hurricane John, like hurricane Kristy a few days later, formed much farther west than most eastern Pacific tropical cyclones. Tropical depression 16 formed near 10°N, 124°W, at 1200 August 2. The depression was slow to develop and had reached only 40 kn by 1800 on the 4th. However, a favorable upper level pattern of a strong building ridge to the north and northwest resulted in rapid intensification to 90 kn by 0600 August 6. Six hours later hurricane John was passed to CPHC moving westward along 12°N at 13 kn. John continued to move due west through the 10th, reached a maximum of 100 kn, and finally dissipated near 160°W. Observations from the POLYNESIA were very helpful on August 7 and 8 in locating John.

HURRICANE KRISTY, AUGUST 8-16

A large area of intense thunderstorm activity, 450 mi in diameter and 140 mi south of Clipperton Island at 0600 August 5, generated the next cyclone of the season. Moving rapidly westward as a tropical disturbance, the area maintained continuity over the next 3-1/2 days. Satellite imagery began to show cyclonic circulation about the center, and the disturbance was upgraded to a tropical depression at 1800 August 8 near 9.5°N, 123.7°W. The cyclone continued to intensify and was upgraded to tropical storm Kristy near 9.7°N, 127°W, at 0600 August 9. Moving rapidly westward around the south side of an upper level high-pressure area, the storm continued to intensify and was upgraded to a hurricane with 65-kn winds near 10.7°N, 133.5°W, at 0600 on the 10th. Figure 12, an enhanced infrared satellite image, shows the cyclone near this position just prior to being upgraded to a hurricane. Tropical storm Lane can be seen 960 mi to the east. Winds remained at 65 kn for 12 hr, then began to diminish. With winds down to 60 kn, Kristy was downgraded to a tropical storm at 0000 August 11 near 10.4°N, 137.9°W. Weather reports from the cargo ships MARCONA EXPORTER and SAKHALINSKIE GORY helped to locate the center of Kristy as the cyclone moved rapidly westward, crossing 140°W longitude and into the CPHC area of responsibility at 0800. Kristy continued to move westward for another 2 days, then slowed to 6 kn, turned northwestward, and intensified to a hurricane again between 156°W and 159°W longitude. Moving across 159°W longitude, Kristy turned westward again and began to weaken rapidly. The final advisory on the cyclone was issued on August 16 with the center dissipating 360 mi southwest of Honolulu, Hawaii.

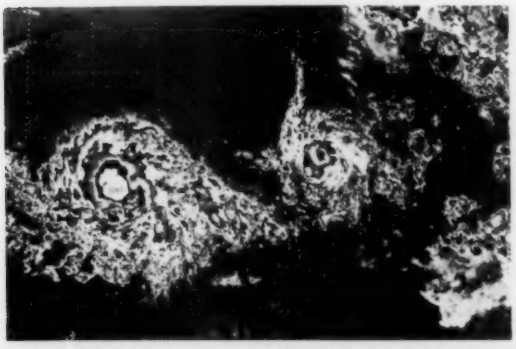


Figure 12.--An enhanced infrared satellite image of tropical storm Kristy just prior to being upgraded to a hurricane near 10.7°N, 133.5°W at 0600 August 10.

TROPICAL STORM LANE, AUGUST 8-15

Tropical cyclone Lane originated as a perturbation on the ITCZ which passed into the Pacific near San Jose, Costa Rica, on August 4. This feature was classified tropical depression 18 at 1800 August 8 near 9.8°N, 110°W. At that time, an upper level HIGH was centered over Arizona and New Mexico. A ridge extended southward through the southern tip of the Baja California peninsula. Tropical depression 18 was near the ridge line in deep easterly flow with windspeeds of 10 to 15 kn. The rather cool 26 to 27°C water over which the disturbance had been traveling was replaced by 28°C water. Even warmer water lay ahead. The depression moved west-northwestward at 1200 August 9 near 11.2°N, 114.2°W, it was named tropical cyclone Lane. Maximum winds were estimated to be 40 kn. At 0600 on the 10th, Lane reached his maximum intensity with 55-kn winds (fig. 12). At that time he was located over 28°C to 29°C water. The 55-kn winds were maintained for 24 hr. As he neared 123°W longitude, increasing vertical wind shear associated with an upper trough between 125°W and 130°W began to take its toll on the storm. Lane was downgraded to a tropical depression at 0600 August 12. By 0600 August 13, Lane had weakened considerably and consisted mainly of a weak low-level circulation. Observations from the cargo ship PIONEER NO. 2 were useful in analyzing tropical cyclone Lane.

HURRICANE MIRIAM, AUGUST 30-SEPTEMBER 6

Miriam began as a tropical depression 160 mi northeast of Clipperton Island at 0000 on August 30. Moving west-northwestward the depression intensified rapidly over 31°C water and was upgraded to tropical storm Miriam at 1800 August 30 near 13.6°N, 111.5°W. The cargo ship SUGAR ISLANDER, reported northeasterly 35-kn winds and 16-ft seas 210 mi northwest of the cyclone. Miriam continued to move west-northwestward for another 6 hr then turned westward near 14.4°N, 112.7°W, and continued to intensify. By 1800

August 31 winds near the center had increased to 65 kn and the storm was upgraded to hurricane Miriam near 14.8°N, 117.4°W. Continuing westward around the south side of an upper level high-pressure area, the cyclone showed little further intensification through the next 24 hr. After 1800 on September 1, winds near the center began to increase again, reaching a maximum intensity of 75 kn by 1200 on the 2d. Winds remained at 75 kn through 0000 September 4 then began to slowly diminish. A weather report from the cargo ship COLUMBUS VICTORIA helped to locate the cyclone at 0600. Turning northwestward, Miriam crossed 140°W longitude and into the CPHC area of responsibility. After crossing 147°W longitude Miriam turned northward and continued to weaken, dissipating 660 mi northeast of the Hawaiian Islands on September 6.

HURRICANE NORMAN, SEPTEMBER 9-18

The 20th tropical cyclone of the season began as a very disorganized tropical depression. Most of the convective activity was concentrated in the southwest quadrant, and the weak circulation center remained on the northeastern edge of the cloud pattern. Early on September 11 the depression began to intensify steadily over 29°C surface water. The storm took a typical west-northwestward track and reached hurricane strength early on the 13th. During the next 2 days hurricane Norman strengthened to more than 90 kn (fig. 13). A ridge line to the north, roughly along 18°N, weakened from the combined effects of Norman to the south and a large midlatitude trough to the north. Early on the 15th, Norman crossed the ridge axis and began recurving to the north-northeast. Over the next 3 days the effects of cooler surface water and increased vertical shear caused Norman to weaken rapidly. The storm finally dissipated on the 18th near 25.8°N, 117.8°W.

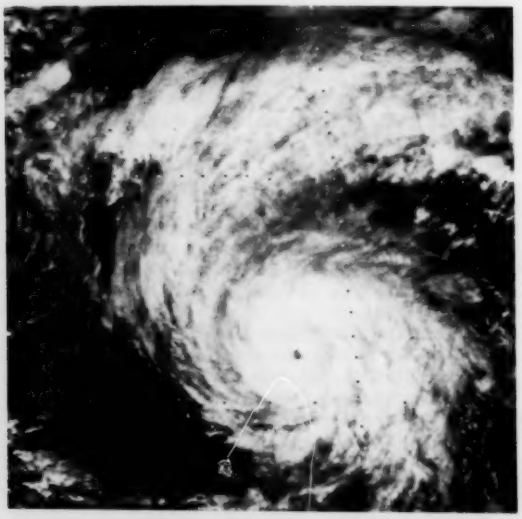


Figure 13.--Hurricane Norman at 2315 September 13 near 15.9°N, 121.2°W with maximum winds of 90 kn.

HURRICANE PAUL, SEPTEMBER 18-30

The 22d tropical cyclone of the season, hurricane Paul, was the most destructive storm of the 1982 season. It originated as a disturbance which moved slowly across Nicaragua between September 15 and 17. Numerous thunderstorms occurred over large portions of Central America at that time. By 1800 September 18 the disturbance had moved about 200 mi offshore from Managua, Nicaragua. Satellite imagery began to show signs of a low-level circulation. This depression, with winds estimated at 30 kn, promptly turned northward, and entered Guatemala near the El Salvador border at about 0000 on the 20th. Heavy thunderstorms had been occurring daily in this area since September 15. With rivers already swollen, this final onslaught of heavy rains produced what was described as the worst natural disaster in El Salvador since the 1965 earthquake. The most severe damage occurred in Montebello, a suburb of San Salvador, located on the slopes of San Salvador Volcano. An 8-ft-high wall of water, mud, and trees crushed a retaining wall, swept down on the city and buried hundreds of houses under 10 ft of mud. The death toll exceeded 300 in the area. For all of San Salvador and portions of Guatemala, the death toll exceeded 1,000. At this point, the deep-layer circulation pattern during the last half of September is of special interest. On September 20, the deep-layer mean analysis is depicted two high-pressure centers: one near Cabo San Lucas, and another off the west coast of Central America near 5°N. An upper level trough, which had been located just off the coast of California since the beginning of the month, remained stationary. It was this trough which steered Paul into the Mexican mainland. Tropical depression 22 had been steered northward into Guatemala in the weak flow between the two high-pressure cells. Before reaching Guatemala City, it was again steered westward out to sea. The cyclonic circulation was ill defined. The former tropical depression was tracked westward as a tropical disturbance. At 0000 September 24, tropical depression 22 began to redevelop near 13.3°N, 140.2°W. It moved northward for 24 hr, then west-northwestward. At 0000 September 26 near 14.8°N, 106.8°W, tropical depression 22 was upgraded to tropical storm Paul with 35-kn winds. Sea-surface temperatures were 28° to 29°C. Rapid intensification followed. At 1800 September 27, Paul became a hurricane with 70-kn winds and abruptly turned northward. Maximum windspeeds of 95 kn were attained at 1200 September 29 near 21.5°N, 100.2°W, just 85 mi south of Cabo San Lucas (fig. 14). Paul accelerated north-northeastward. The eye passed over the southern tip of Baja California between 1800 and 2100. Windspeeds were estimated between 95 and 105 kn near San Jose del Cabo, and near 80 kn at La Paz. Hurricane Paul hit the Mexican mainland 20 mi south of Los Mochis at about 0600 September 30. Winds in Los Mochis reached 86 kn. The greatest damage from wind and flooding occurred between Los Mochis and Guamuchil, a city about 60 mi to the south. In Guamuchil, eight people lost their lives when the bar in which they were drinking collapsed. On the mainland 24,000 people were

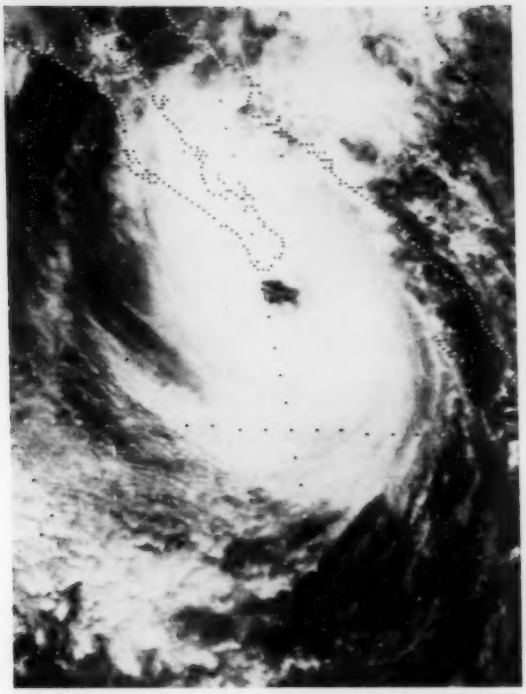


Figure 14.--Hurricane Paul near the southern tip of Baja California at 1715 September 29.

left homeless as were another 9,000 in southern Baja California. It was reported that 80 percent of the Sinaloa state soybean crop was destroyed. Sugar cane, tomato and rice crops were also damaged. Total monetary damage to agriculture exceeded $70 million. Ships which sent observations useful in forecasting Paul included the tanker ARCO SPIRIT and cargo ships TITAN, KIMI MARU, ORIENTAL, MINISTER AND OROMONTE.

HURRICANE OLIVIA, SEPTEMBER 18-25

A weather report from the cargo ship PORT LATTA MARU helped locate the center of the next cyclone 350 mi south-southwest of Acapulco, Mexico at 1800 September 18. Drifting slowly north-northwestward, the cyclone intensified rapidly over 28°C water and was upgraded to tropical storm Olivia near 12.2°N, 102.1°W, at 0600 September 19. A weather report from the cargo ship AMERICAN HIGHWAY, 12 hr later, helped track the storm. Turning northwestward over slightly warmer 29°C water, Olivia continued to intensify and was upgraded to a hurricane at 0600 September 20 at 14°N, 140°W. Weather reports from ships 200 mi west of Olivia showed rough seas, heavy rains, and 30- to 40-kn winds. Winds near the center of Olivia continued to increase rapidly, reaching a maximum of 125 kn at 1800 on the 21st (fig. 15). Weather reports from the tanker ARCO INDEPENDENCE and cargo ships MORAYBANK and TOYOTA MARU No. 16 helped track Olivia during this period. Winds continued at 125 kn through 0600 on the 22d, then began to decrease slowly as the cyclone moved toward colder water. The cyclone turned northwestward around the west side of an upper level HIGH centered over central Baja California. Olivia then began to weaken rapidly and was downgraded to a tropical storm near 22.3°N, 121°W at 1800 on the 23d. Upper level clouds and precipitation from the storm flowed northward and were picked up by strong southwesterly flow aloft and carried inland over the western states and southwestern Canada. The rapidity with which the clouds and moisture spread northward was in large part due to an upper level low-pressure area centered off the California coast. Moderate to heavy rain, ranging from 1/2 to 2 in, was reported over much of California resulting in substantial agricultural losses estimated near $325 million. At least 50 percent of California's raisin crop was destroyed, 25 percent of the wine crop, and 10 percent of the tomato crop. By 0000 September 24 Olivia was near 23.4°N, 122°W. The cyclone turned northward. By 1800 winds near the center were down to 30 kn. The cargo ship OCEAN HIGHWAY reported the weather 150 mi east of the depression. The final advisory on the cyclone was issued at 1800 on the 25th with the center 240 mi west-southwest of San Diego.

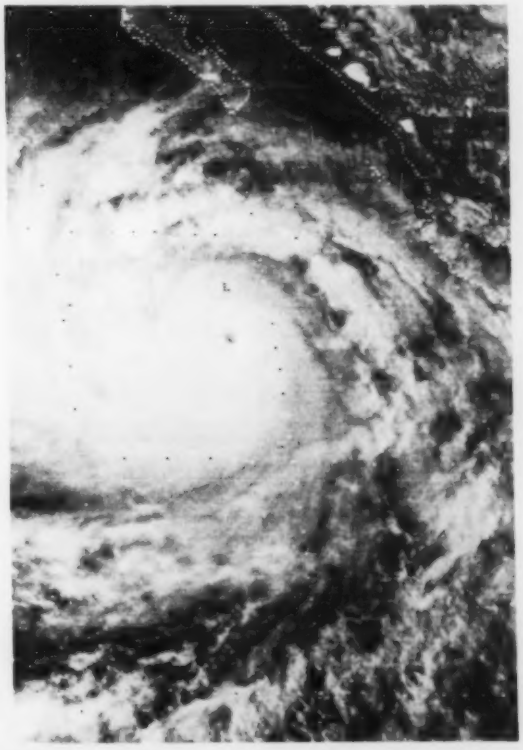


Figure 15.--Hurricane Olivia with 125-kn winds and a well-defined eye 325 mi south of the tip of Baja California at 2318 September 21.

TROPICAL STORM ROSA, SEPTEMBER 30-OCTOBER 6

Tropical Storm Rosa was one of those disorganized tropical cyclones that is difficult to forecast because of the ill-defined circulation center throughout most of its duration. The storm began on September 30 as a well-organized tropical depression near 12.5°N, 95.1°W. The storm moved northwestward slowly and reached maximum intensity of 45 kn at 1800 October 2. By 1800 on the 3rd, Rosa was 110 mi due south of Acapulco. The storm continued to move northwestward, parallel to the coast, until it finally dissipated near 18.6°N, 105.3°W at 1800 October 6.

HURRICANE SERGIO, OCTOBER 14-23

Sergio began as a tropical disturbance 120 mi southwest of Costa Rica at 1800 October 12. Moving west-northwestward the disturbance began to intensify and at 0600 October 14 the cyclone was upgraded to tropical storm Sergio near 9.3°N, 92.4°W. By 0000 on the 15th the winds near the center had reached 65 kn and the storm was upgraded to a hurricane. Weather reports from the FRUITION and PRESIDENT RAMON S. BASTILLO were helpful in tracking the cyclone during this time. The cyclone continued to intensify. A weather report from the cargo ship AMSTELVOORN helped locate Sergio, now with 90-kn winds, at 1800 on the 16th. The hurricane reached its maximum intensity of 110 kn 24 hr later near 13.7°N, 108.6°W (fig. 16). The winds continued at 110 kn for 12 hr then began to slowly diminish as the cyclone moved back over cooler water. The cyclone was downgraded to a tropical storm at 1800 October 21. Sergio turned west-northwestward after 1800 on the 22d and, with winds down to 30 kn, was downgraded to a tropical depression near 17.9°N, 130.6°W, at 0000 on the 23rd.

TROPICAL CYCLONE TARA, OCTOBER 19-26

Tropical cyclone 26, Tara, the last of the season, was associated with a tropical disturbance which moved westward from the coast of Central America. Satellite imagery began to show a cyclonic circulation at 1800 on October 19 near 9.4°N 103.3°W. At that time the sea-surface temperature had risen to 29°C. The depression's circulation pattern remained very disorganized for the first 2 days. This was partially caused by a pocket of cooler water along its path betweer 1200 on the 20th and 0600 on the 22nd. On the 21st the depression turned toward the northwest. At 1200 on the 22nd the sea-surface temperature had risen to 28° to 29°C and the depression was named tropical storm Tara near 14.2°N, 117.1°W. Tara moved west-northwestward, then westward for a time, then again turned northwestward on the 24th. Maximum windspeeds were 45 kt. Much colder water temperatures lay ahead of the storm. At 1800 October 25 Tara was downgraded to a tropical depression.

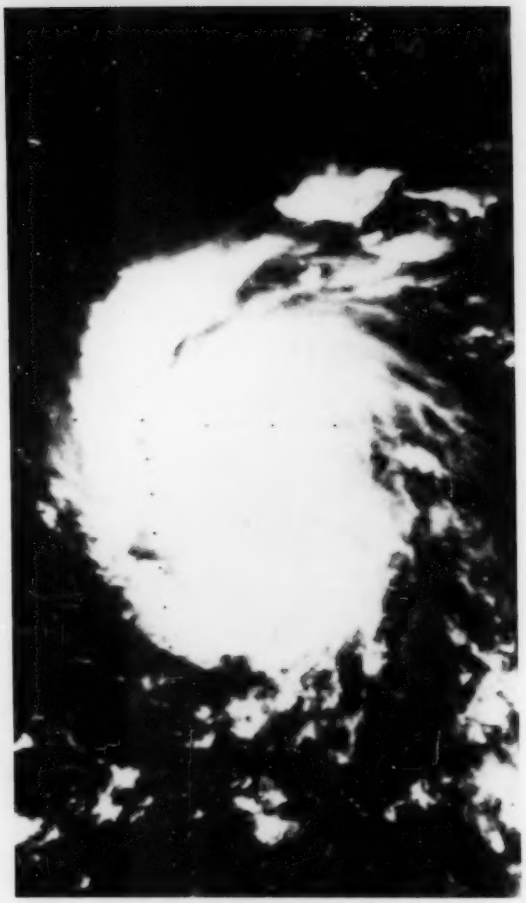


Figure 16.--Hurricane Sergio off the southern coast of Mexico at 1716 October 17 just prior to reaching its maximum intensity of 110 kn.

ACKNOWLEDGMENTS

The authors wish to thank Sharon A. Davis for typing and Glenn E. Rasch for review and authorization for publication of the manuscript.

REFERENCES

Dvorak, Vernon F., 1973: A technique for the analysis and forecasting of tropical cyclone intensities from satellite pictures. NOAA Tech. Memo. NESS 45, 19 pp.

CENTRAL NORTH PACIFIC TROPICAL CYCLONES, 1982

Andrew Chun
Central Pacific Hurricane Center
National Weather Service, NOAA
Honolulu, Hawaii

The Central Pacific had a very busy tropical cyclone season this year with a total of 10 cyclones. Four of them formed and were confined to the central Pacific area of 140° to 180°W. Six moved across 140°W from the Eastern North Pacific area. This was probably a record for storms of tropical storm or greater intensity. Table 5 lists the season statistics and figures 17 and 18 show the storm tracks.

Table 5.--Central North Pacific Tropical Cyclone Data, 1982[1]

Cyclone Number	Name	Dates	Maximum Class	Maximum Sustained Winds (kn)	Lowest Pressure (mb)	Total Hours Observed
1	Emilia	Jul 12-15	Tropical storm	55 (MSH)	N/A	48(TS), 12(TD)
2	Daniel	Jul 16-22	Tropical storm	60 (MSH)	N/A	72(TS), 78(TD)
3	Gilma	Jul 30-Aug 1	Hurricane	75 (MSH)	N/A	6(H), 42(TS), 18(TD)
4	John	Aug 6-10	Hurricane	100 (MSH)	N/A[2]	51(H), 24(TS), 30(TD)
5	Kristy	Aug 11-16	Hurricane	75 (MSH, SHOUK)	982 (SHOUK)	36(H), 84(TS), 12(TD)
6	Akoni	Aug 29-Sep 2	Tropical storm	45 (MSH)	N/A	54(TS), 24(TD)
7	Miriam	Sep 4-6	Tropical storm	45 (MSH)	N/A	18(TS), 36(TD)
8	Ema	Sep 15-18	Tropical storm	40 (MSH)	N/A	60(TS), 18(TD)
9	Hana	Sep 15-19	Tropical storm	45 (MSH)	N/A	42(TS), 36(TD)
10	Iwa	Nov 19-24	Hurricane	80 (SHOUK, MSH)	964 (SHOUK)	48(H), 90(TS)

H = Hurricane
TS = Tropical storm
TD = Tropical depression

[1]Data pertains only to period storm was in the central Pacific.
[2]Reconnaissance flown after storm had peaked and was weakening.

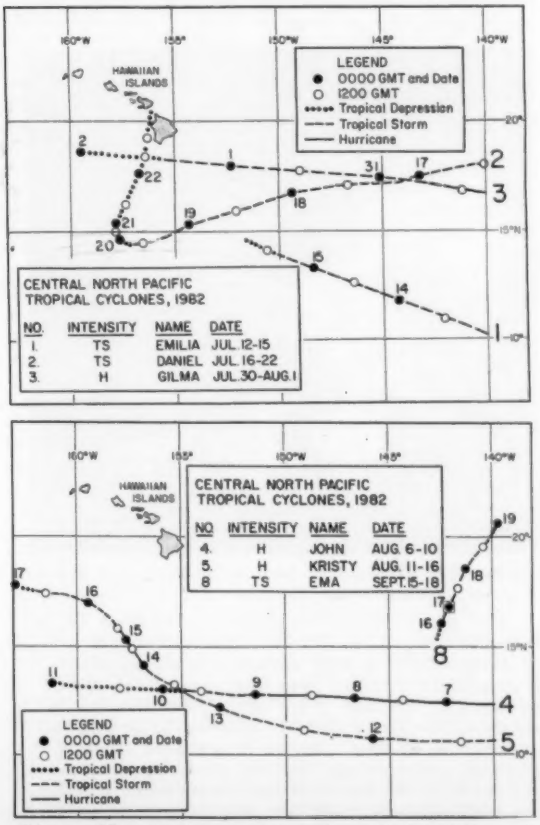


Figure 17.--Cyclone track numbers 1,2,3,4,5, and 8.

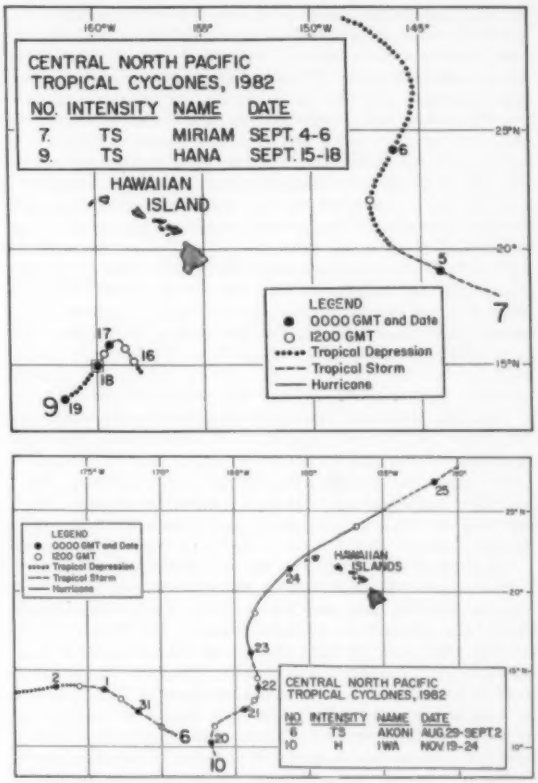


Figure 18.--Cyclone track numbers 6,7,9, and 10.

TROPICAL STORM DANIEL, JULY 16-22

Daniel began as tropical depression 8E on July 7, 1982. The Eastern Pacific Hurricane Center (EPHC) issued its first advisory on the budding tropical cyclone at 1500 on the 7th. It intensified rapidly and was upgraded to a tropical storm and named Daniel at 08/1800. Moving toward the west northwest, Daniel intensified slowly and was upgraded to a hurricane at 10/0000. He continued to intensify and reached peak intensity with maximum sustained winds of 100 kn at 11/1200 near 14.5°N,115°W. Peak intensity was maintained for approximately 12 hr. As he continued westward, Daniel slowly weakened and was downgraded to a tropical storm at 15/0600.

Daniel crossed 140°W and into the Central

Pacific Hurricane Center's (CPHC) area of responsibility as a minimum tropical storm with maximum sustained winds of 35 kn on a heading of 260°. The CPHC issued its first advisory on Daniel at 16/2100. He continued on a south of west course as a weak tropical storm for the next 72 hr and was finally downgraded to a tropical depression at 19/1800 when he was approximately 280 mi south-southwest of South Point, Hawaii. By this time, he was well under the influence of the same upper level trough that caused Emilia's demise a few days earlier. His movement slowed to a standstill for approximately 18 hr before he began to drift slowly northward toward the island of Hawaii. Early on the morning of July 22, Daniel skirted the west coast of Hawaii and dissipated in the Alenuihaha Channel between the islands of Maui and Hawaii.

Daniel's positions and intensities while in the CPHC's area were determined almost entirely by satellite fixes and estimations using the DVORAK technique. However, the existence of a surface circulation when he was quasi-stationary and in a weakened state was verified by the SOUTHLAND STAR. The ship reported a surface wind of 010° at 20 kn approximately 150 mi west of the depression's center at 20/0600. The SOUTHLAND STAR was moving northwest at 20 kn and quickly moved away from Daniel who had begun to drift northward at a speed of 3 to 5 kn.

TROPICAL STORM EMILIA, JULY 12-15

Emilia began as tropical depression 9E near 10.0°N, 136.5°W on July 12. At that time, the depression had maximum sustained winds estimated at 30 kn. The depression continued to intensify and was upgraded to tropical storm Emilia on the ensuing bulletin with maximum sustained winds of 35 kn.

Emilia moved westward at 10-12 kn and crossed 140°W about 13/0300. The CPHC assumed forecast responsibility for Emilia at this time and issued its first advisory on the storm at 13/0900. During the next 24 hr, she moved on a west-northwesterly course and intensified to a storm with maximum sustained winds estimated at 55 kn. As she approached 150°W, Emilia began to feel the effects of the upper level trough that was lying over the Hawaiian Islands to the northwest of her center.

She began to weaken rapidly due to the shearing of her upper level circulation by the southwesterlies aloft and was downgraded to a tropical depression at 1200 on the 15th. Her demise was rapid and the CPHC issued its last advisory on Emilia at 15/2100.

HURRICANE GILMA, JULY 30-AUGUST 1

Gilma came to life near 9.5°N, 117.5°W on July 26. Moving on a slightly north of west course, Gilma intensified into a tropical storm at 1800 on the 26th. She continued to intensify as she moved toward the west-northwest and was upgraded to a hurricane at 28/0600 with maximum sustained winds estimated at 65 kn. Peak intensity was reached about 36 hr later at 29/1800 near 15.6°N, 135.9°W when maximum sustained winds were estimated to be 110 kn. From this point on, she increased her forward speed to about 17 kn and began to slowly weaken.

She crossed 140°W at approximately 30/0900 with maximum sustained winds estimated at 75 to 85 kn. The Central Pacific Hurricane Center issued its first advisory at 1500. Gilma continued to weaken and was downgraded to a tropical storm at 1800. During her trek through the CPHC area, she had an average movement of 17.5 kn. This rate of movement is nearly double the average climatological speed with which tropical cyclones move across this area. Gilma, as with most tropical cyclones which approached the Hawaiian Islands in 1982, met her demise under the upper-level westerlies associated with the Tropical Upper Tropospheric Trough (TUTT). The TUTT was a semi-permanent upper level feature near the Hawaiian Islands throughout the 1982 tropical cyclone season. She was downgraded to a tropical depression at 1200 on August 1.

HURRICANE JOHN, AUGUST 6-10

As with many of the tropical cyclones that passed from the eastern into the central Pacific in 1982, John formed in an unusually active area of the ITCZ between 120°W and 140°W. John began as tropical depression 16E on August 3, 1982 near 11.4°N, 126.5°W. The depression moved westward and intensified into a tropical storm and named John at 04/1800. Within 24 hr, John became a full-fledged hurricane with maximum sustained winds estimated at 70 kn.

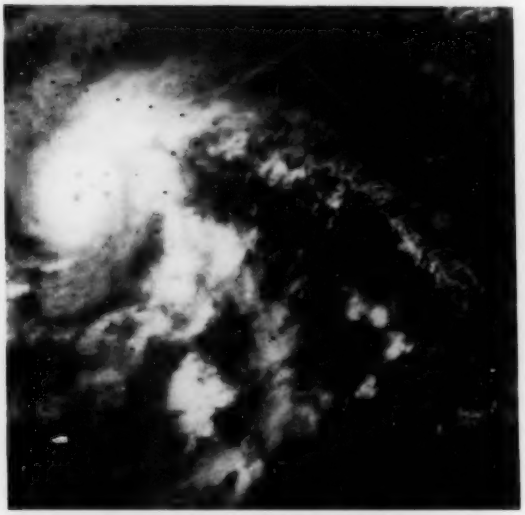


Figure 19.-- Hurricane John at 2320 on the 6th near 12°N, 143°W.

John continued to intensify and crossed 140°W into the Central Pacific Hurricane Center's area of responsibility with maximum sustained winds estimated at 100 kn. The CPHC issued its first advisory at 06/2100 (fig. 19). John remained a steady state hurricane for another 30 hr before he began to weaken. He was downgraded to a tropical storm on the 09/0300 advisory based on Air Force reconnaissance into his center at 0029. The reconnaissance weather officer estimated maximum sustained winds at the surface of 40 kn 25 mi from his center on a bearing of 090°. The sea-level pressure at his center was determined

by dropsonde and correlated well with the estimated maximum surface winds. During his entire life span, John moved on a slightly north of west course and as a tropical depression passed 180 mi south of the island of Hawaii.

John met his demise, as did his 3 predecessors, under the influence of the TUTT that was nearly stationary in the vicinity of the Hawaiian Islands during the entire tropical cyclone. His upper-level cloudiness and convection was sheared off by the southwesterlies aloft and the remnant low level circulation was carried westward by the easterlies. There were no reports of damage or casualties to ships.

HURRICANE KRISTY, AUGUST 11-16

Kristy was formed in the ITCZ approximately 220 mi southeast of the area where John was spawned, near 9.5°N, 122.7°W on August 8. Moving westward, the tropical depression intensified and became a tropical storm at 09/0600. Kristy continued to move on a slightly north of west course, slowly intensifying, and reaching hurricane strength at 0600 on the 10th with maximum sustained winds estimated at 65 kn. Approaching 140°W she began to show signs of weakening and was downgraded to a tropical storm at 11/0000.

Kristy crossed into the CPHC area as a tropical storm with maximum sustained winds estimated at 55 kn. For reasons unknown, Kristy accelerated and tumbled across 10° of longitude in the next 24 hr, an average speed of 25 kn, and still maintained moderate tropical storm strength (45-50 kn). When she finally slowed down, Kristy began to move on a northwesterly track.

The Air Force reconnaissance aircraft that flew into John was held in readiness at Hickam AFB, Hawaii to reconnoiter Kristy. Reconnaissance missions were flown into Kristy's center and around her perimeter on the 12th, 13th, 14th, 15th, and 16th.

Kristy began to show signs on satellite imagery of reintensifying early on August 13. Air Force reconnaissance confirmed this observation and she was upgraded to a hurricane again at 14/0000. Turning to a more northerly direction, Kristy continued to intensify and reached a peak intensity of 80 kn at 14/1800 when she was about 250 mi south of South Point, Hawaii. The upper level westerlies began to make its presence felt about this time and her movement slowed to a crawl for the next 18 hr. Early in the morning of the 15th, she began to pick up speed again and move toward the northwest. Her top had been sheared off during the night and a low-level circulation appeared to the west of heavy convective clouds. Reconnaissance confirmed what the CPHC forecasters had seen happening during the night and based on their estimates of maximum sustained winds, Kristy was downgraded to a tropical storm at 15/1800. She continued to weaken as she moved toward the west and was downgraded to a tropical depression at 1800 on the 16th.

TROPICAL STORM AKONI, AUGUST 29-SEPTEMBER 2

The monsoonal trough that extends eastward from the Asian coastline across the tropical western Pacific had been very persistent through the summer of 1982. In late August the trough worked its way east of the International Date Line. It was during this period that tropical depression 1C came into being near 11°N, 169°W. The CPHC issued its first advisory on tropical depression 1C at 0900 August 30. Moving slowly westward, it intensified rapidly and was named tropical storm Akoni at 30/1800. Akoni moved slowly westward and had maximum sustained winds estimated at 45 kn using satellite imagery and Dvorak's technique.

At 0000 September 1, the ocean-going tug MANA HOLO reported its position as 14 deg 08 min North, 174 deg 44 min West and experiencing heavy rainshowers with an east-northeast wind of 10 to 15 kn and 8- to 10-ft swell. The tug's barometer read 29.65 in or 1004.1 mb. The tug was very near the center of Akoni whose position as determined from satellite imagery was near 14°N, 174°W at the same time.

Maximum sustained winds estimated from satellite imagery corresponded very well with the maximum sustained wind derived by using the tug's pressure to approximate the central pressure of the storm. This was confirmed at 01/0515 when the MANA HOLO reported east-northeast winds of 50 kn gusting to 60 kn and 20-ft swell several miles east of its last reported position. During the next 12 hr, Akoni became quasi-stationary and began to feel the effects of the upper level trough northwest of the center. He was downgraded to a tropical depression at 02/0000 as the remnant low-level circulation continued westward in the easterlies.

TROPICAL STORM MIRIAM, SEPTEMBER 4-6

Miriam originated as tropical depression 19E on August 29 near 12.5°N, 108.5°W. The depression moved in a west-northwest direction, intensified into a tropical storm and was named Miriam at 30/1800. Continuing on a west-northwest course she intensified rapidly and was upgraded to a hurricane at 31/1800. Miriam reached an estimated peak intensity of 75 kn at 1200 on September 2 and remained at a steady state until 04/0000 when she started to weaken. Miriam approached 140°W under the cover of darkness. Satellite fixes, using an area of convection to the south of the actual center, had the storm moving on a slightly south of west course. She was passed to the CPHC at 04/1500.

Using visual satellite imagery, the CPHC forecasters had to relocate the storm further north from her last estimated position. In actuality, Miriam had continued to move on a west-northwest course instead of a course to the west. Her low-level circulation had been separated from the convection on the south side of her center. She was reacting to a mid latitude upper-level trough that was digging southward and the resultant surface low that had developed to the north of her center. Miriam's course changed to one toward the northwest and by 05/1800 had veered further and was just slightly west of north. During this period she had weakened considerably and was downgraded to a tropical depression at 1200 on the 5th. She moved in an S-wave pattern toward the north and became an extra-tropical system.

TROPICAL STORM EMA, SEPTEMBER 15-18

Ema began in an area of convection near 15°N, 140°W. The forecasters at the Central Pacific Hurricane Center watched the area for several days until satellite imagery on September 15 confirmed that a tropical depression had formed. The CPHC issued its first advisory on tropical depression 2C at 15/2100 and centered the system near 15.5°N, 142.5°W. Intensifying as it moved slowly north-northeastward, the tropical depression was upgraded to a tropical storm and named Ema at 16/0000. Between 16/1200 and 17/1200, Ema became quasi-stationary and drifted around a small area near 16.8°N, 142°W, probably going through several small trochoidal loops, before she decided to resume her trek toward the north-northeast (fig. 20). Ema remained a tropical storm for another 24 hr and was downgraded to a tropical depression at 18/1800.

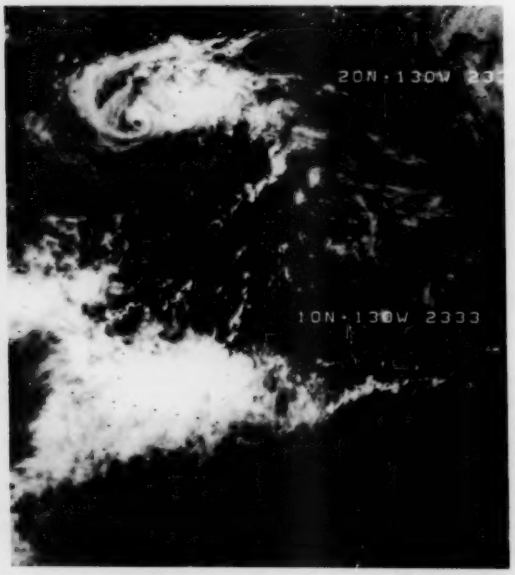


Figure 20.-- Tropical storm Ema at 2336 on the 16th. The Inter-Tropical Convergence Zone (ITCZ) is between 5° and 10°N.

Ema's movement toward the north-northeast was influenced by a surface trough that developed west of the Oregon-California coast under a 500-mb LOW that dug southwestward from a position over the Pacific Northwest. There were also several short wave troughs at higher levels that scooted rapidly by to the north of Ema that caused her to weaken and move toward the northeast.

During her entire life span, position and intensity estimates were made from satellites. Maximum sustained winds at Ema's peak were estimated to be 40 kn.

The last advisory issued by the CPHC was issued at 19/0300 when the remains of tropical depression Ema were just east of 140°W. Coordination with the Eastern Pacific Hurricane Center resulted in putting tropical depression Ema to rest.

TROPICAL STORM HANA, SEPTEMBER 15-18

Hana started in similar fashion as Ema over the same time period. The forecasters at the CPHC had kept watch on an area of convection to the south of the Hawaiian Islands for several days. Satellite imagery on September 15 indicated that the mass of convection had become organized during the night and the CPHC issued its first advisory on tropical depression 3C centered near 14.7°N, 158°W at 2100 on the 15th. Tropical depression 3C intensified rapidly and was upgraded to tropical storm Hana at 16/0000.

Hana moved on a steady course toward the north-northwest for 24 hr. Her low-level circulation during her entire life cycle as a tropical storm was obscured by high clouds and convection. All position and intensity estimates on Hana were made from satellite imagery using the Dvorak technique. Fixes at 17/0000, 17/0600, and 17/1200 were suspect because the low-level circulation was not discernible (fig. 21). Low cloud banding seen in satellite imagery used to make the 17/1800 fix indicated that the center of the storm was approximately 100 mi south and east of the 0600 and 1200 positions, so the system was relocated to a position near 14.9°N, 160°W. Hana remained quasi-stationary for the next 18 hr and probably went through a trochoidal loop before exiting and moving on a course toward the southwest. A very weak low-level circulation made its appearance at this time and Hana was downgraded to a depression.

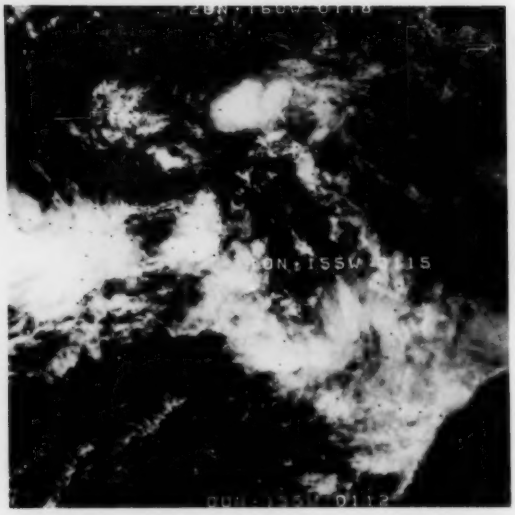


Figure 21.-- Tropical storm Hana at 0117 of the 17th near 16°N, 159°W is a small storm. Another view of the ITCZ.

Marine Observations Program

J. W. Nickerson
National Weather Service, NOAA, W/OTS21x2
Silver Spring, MD 20910

MARINERS WEATHER LOG (MWL) HOGS

Some of you are treating the MWL that we mail to the ship as your private property. It isn't. We mail these to each ship in the Cooperative Ship Program (CSP) so we can pass on the word. Everyone should see it as soon as practical. If you want a private copy, subscribe to it. The subscription form is on the back page.

MORE OBSERVATIONS -- BETTER FORECASTS

I just looked at the U.S. 0600 weather map. It isn't intended for marine forecasts and only includes the oceans for about 1200 mi off the east and west coast. What caught my eye was the cut-off time -- 0649, and the large number of ship weather reports. There were 48! It means that a lot of ship observers and radio officers are teaming up to really get those observations transmitted. That is outstanding! Please continue, it will pay off for you in better forecasts.

LETTERS, COMPLIMENTS, COMMENTS, AND COMPLAINTS

Sometime ago I said that mariners were "our most silent majority." In about 97 percent of the cases this remains true, but a couple dozen have taken pen in hand. The Marine Observations Program staff of two obviously cannot keep up and answer every letter. We do read them carefully and use the material. You will see the results of your letters in the MWL. To Olaf, Matthew, John, Julius, Toni, Dave, and a couple dozen others, thanks for your contributions. You have helped us understand your problems and varying situations. Please keep your letters coming and encourage others to state their views.

THE GOOD OLD DAYS

Every so often we hear a lament about how good the old form was or how this "new" code is just too long and complicated. Unfortunately, the disgruntled observer usually has not read the foreward, introduction, and Chapter 1 of the National Weather Service Observing Handbook No. 1, Marine Surface Weather Observations, (NWSOH No. 1, 1-82), and doesn't know much more about the old handbook (8-74 to 6-79). Going through the new NWSOH No. 1 is the first part of a course I teach at the "Maritime Institute of Technology and Graduate Studies" (MITAGS), Linthicum Heights, Md., because some in each class will not have done this basic reading.

The present code format, as printed on Form 72-1A and 72-4A, is like a tool box. You only take out and use the tools you need for the job. However, no code, or form to record it on, is perfect, so we always welcome suggestions and comments. Please explain why a change would be better.

PRESENT AND OLD CODE FORMAT COMPARED

The present code only requires the call sign and 5 groups (fig.22); the old code required 8 groups. The other groups are all optional. In the present code all of the data pertaining to a particular observational element is contained in that group (except swell) including the tenths values. In the old code the observation elements were fitted to the space. For instance, pressure and air temperature were joined in the mandatory section, but the air temperature tenths code didn't appear until four groups later in the optional section. Another bad one was the difference between air and sea water temperature. I guess they wanted to check your skill at subtraction.

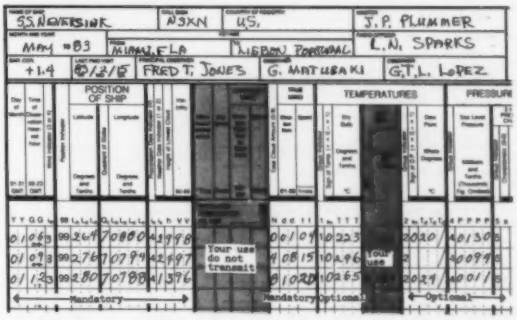


Figure 22.-- The Ship's Observations form completed through sea-level pressure showing the five mandatory groups.

The advantage of having mandatory and optional groups is that you can shorten the report because you are in traffic, or for whatever reason, and still get a report out. The present mandatory code groups are:

(CALL SIGN) YYGGiw 99LaLaLa QcLoLoLoLo
$i_R i_x$hVV Nddff

That is the minimum sized message that will make the computer run and assure distribution throughout the system, as explained in Chapter 1, NWSOH No. 1.

Many of you question the priority, or even the usefulness of the $i_R i_x$hVV group. We'll check it out and find out who is using the data and why it is in the mandatory group.

SHIP'S WEATHER OBSERVATIONS - NOAA FORM 72-1A

One page of the form is usually torn from the pad and used. Some are still having trouble getting the sheets to tear cleanly. To correct this, fold the cover back all the way to the edge of the staples. Grasp the form pad firmly at the top of the perforations, lift the right upper corner of the page with the right hand and

tear. If you don't have a clear tear on the previous sheets they will continue to tear off ragged so clear the ragged edges and it should tear off square. I use the form at MITAGS and tear them square every time so I know it can be done.

THE HEADING BLOCK

The Heading Block as shown in figure 22 must be completed on each form. These data are needed to properly catalog them at the National Climatic Data Center, see Chapter 1 of the NWSOH NO. 1. The Servicing Port Meteorological Officer (PMO) needs almost all of this information to be sure your ship is visited frequently, barometer corrected, and that the observers understand the observation procedures. The observers use the barometric correction to correct the sea level pressure reading in group 4PPPP.

SHIP'S ADDRESS BLOCK

On the back of each NOAA Form 72-1A is an address block as shown in figure 23.

We need this information to make sure your mailing address is correct so we can send you the Mariners Weather Log, Pilot Charts, Notice to Mariners and other material. Please help us keep our mailing list up to date.

METEOROLOGICAL SERVICES TO OBSERVING SHIPS

To correct shortcomings or problems experienced by mariners providing weather and oceanographic observations, we ask that you evaluate the services received in as much detail as possible. Your comments will help improve our services to you.

Your comments should be noted on the back of the page where they occur. On the last page of the Ship's Weather Observations, NOAA Form 72-1A, we request that you complete the heading block below and check the appropriate comments summary so that no comments are missed.

Your completed weather observation record forms should be mailed to your servicing Port Meteorological Officer (PMO) at the end of each month in the pre-addressed envelopes provided or the PMO may pick these up when he visits your ship.

SHIP'S NAME (Give both old and new name, if changed.)	CALL SIGN	DATE	NO. OF 72-1A'S INCLUDED
SS NEIERDINK EX-LEEKYPLUG	N3XN	5/M/83	2

MAILING ADDRESS ☒ Check if this is a new address.	VOYAGE	
LIFTHAT BARGE CO, INC. 14 RIGHT WAY SKEEDOO, N.J. 43911	FROM: MIAMI, FLA USA	TO: LISBON, PORTUGAL
	NORMAL ROUTE: NORFOLK — BREMERHAVEN	
	PMO: BROWN	

COMMENTS SUMMARY:

☒ Forecast evaluation, dates: 5/1/83

☒ Communications difficulties, dates: 5/1/83, 5/7, 5/9

☒ Request PMO visit: Port NORFOLK Date 6/2-6/4

Figure 23.— Ship's address block on the reverse side of the NOAA Form 72-1A.

- The forms should be mailed in the preaddressed envelopes to your Servicing PMO at the end of each month, or when you return to a U.S. Port.
- The heading Block on the front of each Form 72-1A should be completed.
- Only one Ship's Address Block in each package of Form 72-1A need be filled out, but please be sure one is so that mailed materials will reach you.
- Put all the forms 72-1A, 72-4A, and WS 455-12 (Barogram) into the envelope preaddressed to your Servicing PMO and mail it each month or when you return to the U.S.

NEW FORM DESIGNS

We have had several changes in procedures that indicate we should update our forms, both the 72-1A and the 72-4A. It is important that these changes improve the forms for you, if possible. If you have changes in mind, or if you like the way it is -- let us know. You can either write me or put your comments in the Forecast Evaluation section on the back of the Form 72-1A. It is just as important to identify what you like -- so it won't be changed -- as it is to recommend a change.

FILLING IN THE FORMS

As pointed out in Chapter 1 of the NWSOH No. 1. there are two routes that your observation will follow: the real-time, or urgent transmission route to get the observation to the forecaster in time for the next weather map. And, the climatological route, where the data is recorded and mailed to the Servicing PMO. These data eventually become climatological maps, tables, engineering data, and the base for most computer models.

From your letters there are some grey areas in how to fill out the forms. Please write me if you don't find the answers to your questions here.

FORM 72-1A SHIP'S WEATHER OBSERVATIONS

This form should be filled out as completely as possible; however, only the first 5 groups are mandatory (not counting the shaded columns). That is, over to and including the Nddff group.

Notice that all of the groups to the right of Nddff have a Group Indicator number. Any group with a Group Indicator number may be completely omitted both on the 72-1A and the 72-4A without affecting any of the rest of the observation. Also, notice that after the group 222 $D_s v_s$ the Group Indicator numbers are repeated. If you use any group to the right of the 222 indicator, the 222 must be included or the computer will interpret the group as belonging in the first section. For instance, if you wanted to report sea waves, 2PwPwHwHw, but neglected to use the 222 $D_s v_s$ group, your sea waves would appear in the dew point column.

The Weather Indicator, i_x is used to indicate if the present and past weather group 7wwW$_1$W$_2$ is, or is not, significant, and is, or is not, included in the radio weather report. The key word here is weather, not clouds, weather. Code figures for ww of 00, 01, 02, 03, and code figures 0, 1, and 2 of the W$_1$W$_2$ code table shall be considered to represent phenomena without significance. These figures represent clouds, not weather and the entire 7wwW$_1$W$_2$ group should be omitted. The code i_x, in this case, would be 2. However, if one or more of the codes ww, W$_1$, or W$_2$ are significant, the 7

wwW_1W_2 should be logged and reported. The code i_x, in this instance, is 1.

The Shaded Columns

These are for your convenience in logging the observation of elements that have to be manipulated to produce the values used on the record and in the report. For instance, if you estimated the wind from the sea surface you would not need to make any entries in the ship's course, speed, or apparent wind in the shaded column. Just check the estimated box and fill in the ddff directly.

The Sign of the Temperature, S_n

This is a code used to set the computer programs. Positive values (including 0) are coded 0, minus values are coded 1.

Cloud Group $8N_hC_LC_MC_H$

The weather reports are a detective game where you encode the weather you see and the forecaster tries to reconstruct what you see from the coded weather report. Several groups interact with each other. The difficulties of this game are most apparent with the cloud group. Most everyone does pretty well with the cloud types, but the trouble comes with the amount of low clouds, 0, and /.

N_h is the amount of all the low clouds, C_L, or if there are no C_L clouds present, the amount of all the C_M clouds present. There could be more than one layer or patch in each grouping or genera. We sometimes see N_h the same as N, the total sky cover in the group Nddff, and C_H and/or C_H clouds listed as well as C_L. If the cloud group lists more than one type, then N_h must be less than N. Conversely, if we subtract N_h from N, we can find the amount of sky covered by the C_MC_H, C_M, or C_H.

The 0 means no clouds of that particular grouping or genera. The / indicates that the clouds of that particular grouping or genera cannot be seen because of darkness, fog, blowing dust, sand or other vision obstructing phenomena, or because of a continuous layer of lower clouds. If there are breaks in the clouds and you do not see higher clouds you record 0 higher clouds. Example: 85280, 85208, 85028 or 886//, but 0528/, 852/8 or 85/28 would be wrong because / indicates an obstruction to vision.

The Wind Wave or Sea, 2PwPwHwHw

If the sea is calm, PwPw and HwHw would both be reported as 00., i.e., 20000. However, if there is a swell, but no wind wave the 2PwPwHwHw is omitted and only the swell group(s) reported. When the estimation of the period PwPw is impossible because of a confused sea PwPw shall be reported as 99. If for the same reason wave height cannot be estimated report HwHw as //, i.e., 299//. If you haven't measured (estimated) the wave period or height, omit the entire group. On page 2-119, Explanations, following the second paragraph add the sentence: Omit this group rather than report 2////.

Swell Wave Groups, $3d_{w1}d_{w1}d_{w2}d_{w2}$ $4P_{w1}P_{w1}H_{w1}H_{w1}$ $5P_{w2}P_{w2}H_{w2}H_{w2}$

If there are no swells omit all swell wave groups, $3d_{w1}d_{w1}d_{w2}d_{w2}$ $4P_{w1}P_{w1}H_{w1}H_{w1}$ $5P_{w2}P_{w2}H_{w2}H_{w2}$.

Swell may be distinquished from wind waves in that swell have longer, rounded crests. They move faster than waves and have longer more uniform wave lengths, heights, and periods. The slope of the sides of swell waves are much shallower than wind waves or sea.

Swell can be coming from the same direction as the wind wave, but would have to be distinctly and remarkably different to be reported separately from the wind wave.

Please make the following corrections to the NWSOH No. 1 which should help better understand these groups.

- Page 2-126, Table 2.10, line through "00 calm" and "99 Direction indeterminate." By definition, swell are uniform in wave length, period and height.
- Page 2-127, Explanations, second paragraph, line out the sentence "When the period . . . . ., enter 99."
- Page 2-128, Table 2.26, line out the last entry, "// Not determined . . . ."
- Page 2-129, Explanations, paragraph 2, line 2, line out the sentence, "When the period . . . . . ., enter 99."
- Page 2-130, Table 2.26, line out last entry "// Not determined . . . ."

Most of the reports that I have reviewed have been really reaching to fill in all the message blanks. Actually, it should be the other way around. What actually is significant to the forecaster? Comments at MITAGS show that the observer (mate) wants to produce the best possible observation and that he would rather send nothing than send an "incomplete" observation. Great spirit -- wrong philosophy!

Weather buoys report only wind, pressure, air temperature, water temperature, wave height and period, but they do it every hour from the same place, good or bad weather. As a result these observations are considered very important. If a ship observer could only report a minimum observation because of traffic and other duties, what would he report? He would, of course, have to report the mandatory groups. After that the general consensus is that pressure and waves would be top priority. The reduced message would then be: (call sign) YYGGiw 99LaLaLa QcLoLoLoLo i_Ri_xhVV Nddff 4PPPP 222// $2P_wP_wH_wH_w$

Naturally, we want as complete observations as possible because we have no other way of knowing what the weather is at your location. We will be looking into priorities, usage, and value of the various weather observation elements in the future.

Meanwhile, what data do you need to get back in the forecasts?

SOMEBODY GOOFED

On the Defense Mapping Agency Hydrographic/ Topographic Center Publication 606, Guide to Marine Observing and Reporting story. The long awaited Pub. 606 and the forms that we have listed on the reverse of the NOAA Form 72-1A have finally arrived and are available through the PMO's. That is the good news. The bad news is the NOAA section is fouled up. Somehow the Pub. 606 draft was reviewed by "someone in NOAA," but Marine Observations never saw it. Consequently, there is nothing about the DMA/NOAA cooperative efforts to improve our services to the mariner and streamline our operations. Some of the references are also in error. We will be working with DMA to correct the Pub. 606 and advise the "someone in NOAA" about the Marine Observations Program.

Somewhere in Chapter IV, page 19, we will recommend mentioning that the PMO's will also act as DMA liaison to help you get the forms you need in the ports with PMO's, but no DMA officers. We also cross-reference our mailing lists so all of the ships in either Cooperative Ship Program will get the publications they need.

The Office of Public Affairs, second column, page 19, would appreciate it if you referred weather observation information or questions to the PMO's, or:

Jerome W. Nickerson -- W/OTS21x2
Marine Observation Program Leader
National Weather Service/NOAA
8060 13th Street
Silver Spring, Maryland 20910
Telephone: (301) 427-7724

In Appendix B, pages 45 and 46, there is a copy of the current Ship's Weather Observations, NOAA Form 72-1A. We hope to have the observation form updated by the next issue of the Pub. 606.

Pages 47, 48, and 49, are in error and should be crossed through. Although you see NOAA Form 72-1A in several places, the write up is based on the pre-1982 code format which has been superseded. Refer to the National Weather Service Observing Handbook No. 1, Marine Surface Weather Observations (NWSOH No. 1) for the correct codes.

Tips to the Radio Officer

WWV WEATHER SEGMENT. BACK ON THE AIR.

In the last issue of Mariners Weather Log we reported the discontinuance of the weather segments on radio station WWV. The response from those who relied on WWV weather programming was a key factor in restoring the service on March 7, 1983. It was interesting to note that comments were received from all areas of marine activity ranging from recreation boaters to high seas shipping.

REVISED MARINE FORECAST AREAS

The National Weather Service has revised several coastal forecast areas in the northern Gulf of Mexico, and offshore areas in the mid-Atlantic and New England states. The following revised areas with new message headings are now being used in marine weather broadcasts.

Apalachicola to but not including Pensacola out to 50 mi.	APALACHICOLA TO PENSACOLA OUT 50 mi.
Pensacola to but not including Gulfport out to 50 mi.	PENSACOLA TO GULFPORT OUT 50 mi.
Gulfport to but not including mouth of Mississippi River (South Pass) out to 50 mi.	GULFPORT TO MISSISSIPPI RIVER OUT 50 mi.
Mouth of Mississippi River (South Pass) to Intracoastal City inclusive out to 50 mi.	MISSISSIPPI RIVER TO INTRACOASTAL CITY OUT 50 mi.
Intracoastal City to but not including Port Arthur out to 50 mi.	INTRACOASTAL CITY TO PORT ARTHUR OUT 50 mi.

New England Area

Gulf of Me. from coastal waters east of 66.5°W, south to Fundian Channel (42.5°N) and on a line southwest to coastal waters off Nantucket Island, Mass.	GULF OF MAINE
South of Nova Scotia from 60°W along the 1000 fathom line to 41.5°N, 65.5°W to 41.5°N, 66.5°W to the Coastal waters of Nova Scotia.	SOUTH OF NOVA SCOTIA FROM SABLE ISLAND TO NORTHEAST CHANNEL OUT TO 1000 FATHOMS
Georges Bank west of "South of Nova Scotia" and south of the "Gulf of Maine" to 1000 fathom line to 69°W.	GEORGES BANK (FROM NE CHANNEL TO GREAT SOUTH CHANNEL OUT TO 1000 FATHOMS)
South of New England and Long Island coastal waters to the 1000 fathom line between 69°W and a line from Manasquan, N.J. & 39°N, 72°W.	SOUTH OF NEW ENGLAND FROM GREAT SOUTH CHANNEL TO AND INCLUDING HUDSON CANYON OUT TO 1000 FATHOMS.

The following are subsets of the WEST CENTRAL NORTH ATLANTIC offshore forecast area:

The area bounded by the seaward extent of the coastal waters on the west, the 1000 fathom line on the east, a line from Manasquan, N.J. & 39°N, 72°W on the north, and 38°N on the south.	HUDSON CANYON TO BALTIMORE CANYON

The area bounded by the seaward extent of the coastal waters on the west, the 1000 fathom line on the east, 38°N on the north, and 34°N on the south.	BALTIMORE CANYON TO HATTERAS CANYON
The area bounded by the seaward extent of the coastal waters on the west, the 1000 fathom line on the east, 34°N on the north and 32°N on the south.	HATTERAS CANYON TO BLAKE RIDGE

SHIPS WEATHER OBSERVATIONS, NOAA FORM 72-1A

Please complete the section on "Communications Difficulties" on the back of the Ship's Weather Observations, NOAA Form 72-1A if you have communications problems. We have good liaison with U.S. Coast Guard communications people.

From all indications, the Coast Guard is really trying to get the weather messages through on time. True, there are delays, but these are decreasing. Your comments would help us. Let us know how long you have to wait. Write Nickerson, Marine Observations and drop it in the PMO envelope.

AMVER and USMER reports will combine shortly which will help some; however, there are a lot of these messages still coming in right at the synoptic hour. If you send in yours at that time, could you give us a window of a half hour before the synoptic hour to one hour after for weather reports. Thanks.

CW and SITOW weather messages through the U.S. Coast Guard no longer require a preamble or "OBS METEO WASH DC" address. They say they are told it's an "OBS" message on the initial contact and they know all the rest, so just send the call sign and the weather report.

INMARSAT (COMSAT) weather messages do not need a preamble, identification, or address either. Just use the Telex No. 230 89406. Please use a punched tape rather than typing on-line. In this way the normal message time is less than 30 seconds.

Commercial CW and SITOR is supposed to be a back up to assure you can get the weather report through. However, it appears that some ships and radio stations are killing the goose that laid the golden egg by overuse.

At present, we are accepting charges from the Pacific north of the Equator and east of the dateline, and in the Atlantic from north of the Equator and west of longitude 35°W. Single weather reports will be accepted from the current synoptic hour to 3 hr after that hour. Messages should be sent in 10-character groups starting with the indicator 99. Ships that do use commercial CW or SITOR should include the NOAA Form 72-4A in the envelope with the Ship's Weather Observations, NOAA Form 72-1A.

Single sideband radio weather reports are being accepted by the U.S. Coast Guard for those who have secured the CW or SITOR, or are not equipped. The weather report is the same as CW, except the numbers are spoken. These reports get the same treatment at the forecast office.

The Weather Report, Form 72-4A is outmoded with all the recent changes. We could use some comments and suggestions on how the new one should look (write Nickerson).

In Marine Observations, we are continuing to hear rumors (more like horror stories) through the PMO's of poor reception, poor quality facsimile, forecasts getting to you late, other information sent when the forecast should have been, etc. Can you document these problems and how they mismatch to your watch routine so we can start correcting them? Please send us copies of these things, late forecasts, fax maps, etc.

AMVER radio wave propagation maps have been an economy target lately. That's the radio wave forecast charts in the AMVER Bulletin that recommends the best frequencies to use. Do you use them? Are they accurate? Do you want them to continue?

The Editor's Desk

HEAVY ARCTIC HAZE

A pollutant-laden haze appearing in the Arctic each winter is far heavier than expected this year, sharpening interest in its possible effects upon world climate.

Dr. Russell C. Schnell, of the Commerce Department's National Oceanic and Atmospheric Administration, said recent flights through the haze from Anchorage, Alaska, surprised government and university scientists.

The haze layers were found to be much more numerous than anticipated, and the intensity of the pollution larger than expected. The pollution was spread over much larger areas than originally had thought it would be. The haze was exceedingly thick just above the ice cap, thinning at higher altitudes. One surprise was that the haze reached 18,000 ft.

Preliminary analysis of air samples taken on the first flight from Anchorage indicated the haze was composed largely of PCE--perchloroethylene, a chemical used, among other purposes, in dry cleaning solutions-- and hydrocarbons from burning fossil fuel. This appears to support the belief the haze is caused by human activities. Much of the haze is thought to originate from Europe and Northern Asia.

Air masses from these areas are transported into the Arctic during the winter months, carrying pollutant particles and gases which could be causing atmospheric warming. The extent of warming, and the potential impact upon the world's climate, are not known because, until now, there has been insufficient data from which to develop more accurate climate models.

The NOAA plane flew back and forth through the

haze for hours, collecting samples and obtaining real-time instrument readings. At times, the four-engine aircraft was 50 ft above the surface of the ice pack, while on other passes it was nearly 30,000 ft high.

The Anchorage-based flights were to be followed by others from Thule, Greenland, and Bodo, Norway, with at least one mission taking measurements over the North Pole.

BILL PROPOSED TO PERMIT FEES FOR COAST GUARD SERVICES

Secretary of Transportation Elizabeth Hanford Dole has proposed that Congress enact legislation to open the way for the Coast Guard to charge user fees for certain direct services. The Administration proposal would repeal a prohibition in the existing law against charging for certain services to commercial U.S. vessels.

"The proposal is consistent with President Reagan's philosophy that users of a direct service provided by the Federal Government should bear the cost of maintaining that service," Secretary Dole said. "This is particularly true when costs can be allocated in a fair and equitable manner, as is the case with most areas of transportation.

"Sixty-nine percent of the Department of Transportations's $27 billion budget will be paid by the users of transportation services, rather than by the general taxpayer. The Highway Trust Fund, which financed the building of the Interstate Highway System draws its revenue from a user fee -- the Federal gasoline tax. Users of air services will finance, among other things, the modernization of the national airspace system, a multi-billion dollar investment."

Repeal of the provision of section 331, Title 46 of the U. S. Code, would permit the charging of fees for commercial vessel safety services such as the inspection, measurement, documentation, and recording of title of a U.S. vessel, the licensing of an operator or a merchant officer and the certification of a merchant seaman.

Such fees would be permitted under the general User Charge Statute, which was passed in the 1950s and is used by various agencies to recover costs for certain services.

Secretary Dole said that under the general User Charge Statute the Coast Guard may also establish user fees for certain direct services not affected by the prohibition. They include issuance of permits for private aids to navigation, issuance of a regatta permit, conducting of the transfer of a cargo of hazardous material and domestic icebreaking upon request.

The Secretary said the Department of Transportation does not intend to impose user fees for recreational boat owners, for commercial fishermen or for search and rescue services.

The current proposal does not set forth specific fees or levels of cost recovery. Any proposed new user fees would be established only after providing public notice and an opportunity for interested persons to comment through the normal rulemaking process. The public would be invited to comment on the propriety and the proposed level of such fees.

Passage of the legislation would enable DOT to implement more fully its cost recovery program in the transportation sector. It would also place the Department on a more equal footing with other federal agencies that collect fees under the User Charge Statute.

EAST COAST STORM PROBES

Winter storms sweeping up the Atlantic coastline may hold little pleasure for residents of the Northeast, but for scientists with NOAA and NASA every such storm during January was eagerly awaited.

The scientists--meteorologists and oceanographers--hoped for at least three "cold air mass outbreaks" over the ocean between Long Island and the Delmarva Peninsula during January. The storms normally occur on the average of every 3 or 4 days and the researchers planned to fly through them gathering data on the exchange of energy between the air and the sea.

Meteorologists among the research team expect to better understand the influence of the ocean upon weather and climate. Oceanographers, on the other hand, will be studying the effect storm-generated winds have upon the ocean and the development of dangerous offshore wave conditions.

The passage of a cold front over the East Coast results in the mass of cold air behind the front moving offshore over the warmer waters of the ocean. It is during such cold-air outbreaks that the exchanges of heat, moisture and momentum between the ocean and atmosphere are at, or near, their maximum. Understanding the changes in the upper ocean and lower atmosphere caused by these large energy transfers is important to improving the ability to forecast the rapid development of potentially damaging storms off the East Coast.

Data gathered during the study will also enable NASA scientists to verify a technique that they developed for estimating atmosphere-ocean energy transfers using routinely available satellite imagery.

The researchers--from NOAA, NASA's Goddard Space Flight Center and the Applied Physics Lab of Johns Hopkins University--will operate from NASA's Wallops Island Va., station, using both NOAA and NASA research aircraft. They anticipated flying into at least three outbreaks with instruments aboard the planes measuring heat fluxes, temperature, humidity, and winds through the lower atmosphere, along with ocean-surface temperatures, and ocean wave structure and spectra.

BERING SEA ICE STUDIES

Ice behavior in Alaska's Bering Sea, an area of extensive commercial fishing, and expected heavily increasing oil-related activities, will be studies by NOAA scientists. During February 1983, oceanographers and meteorologists will investigate the movement and break-up of pack ice, prior to developing a theoretical computer model for use in forecasting changes in ice position.

The results will apply directly to the design and placement of offshore oil rigs in the Bering Sea, prediction of safe routes for tankers and resupply craft transporting oil and supplies across the area, and activities of vessels involved in the $570 million-a-year fishing

industry in the Bering Sea.

The Bering Sea ice edge continually advances into, and retreats from, the open water. To develop an accurate forecast model, scientists need to understand better how the horizontal movement, shape alteration, and melting of sea ice in the marginal ice zone all contribute to the ice edge's locations and properties.

The marginal ice zone is a region within the ice pack that is strongly affected by the contiguous open ocean. Adjacent warmer ocean water increases ice melting, and storm-generated ocean swells break off ice floes up to 60 mi into the pack.

Meteorological factors are also involved. During winter when the wind blows off the ice pack toward the open ocean, the ice advances into the sea, and floes along the edge are pushed into warmer water. When the wind shifts, blowing from the ocean, the ice is driven back toward the north and is recompacted. This is believed to cause fractures, rafting and ridging far into the ice pack.

LETTERS TO THE EDITOR

SEA SMOKE

The following letter and photographs were sent to Julius Soileau, Port Meteorological Officer, Houston, Texas by Jim Lay, 2nd Mate of the S.S. INGER. Mr. Soileau forwarded the letter and photographs to the Mariners Weather Log.

31 December 1982

Julius--

I thought you'd be interested in the enclosed photos (fig. 24) which I took just before I got off the S.S. INGER for vacation. The date was December 10, 1982, time 0630 E.S.T. The ship was at anchor in Narragansett Bay, East Passage, 1 mile south of the Newport (R.I.)--Jamestown Bridge. Air temperature was 18°F and the sea water was 53°F. Wind; 340°T. Force 2-3. Altogether, a good example of "Sea Smoke".

Here's wishing you, your family, and your staff a Happy and Prosperous 1983!

Jim Lay, 2/M
S.S. INGER
On vacation

Figure 24.--Sea smoke on Narragansett Bay by Jim Lay.

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure patterns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones worldwide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log

October, November and December 1982

WEATHER LOG, OCTOBER 1982--The tracks of the extratropical cyclone centers over the ocean were widely dispersed from latitude 33°N to 80°N. There was no path of primary concentration. The tracks were generally oriented east to northeasterly over the western two-thirds of the ocean, turning north to northeasterly over the eastern third. Two storms took an east-southeasterly path off the coast of the United States. Four storm centers passed over or near the Great Lakes. Only a few of the storms managed to cross the coastlines of Europe. Climatology tends toward the dispersed pattern as it shows five primary tracks over the ocean area but oriented more northerly over the western half and easterly over the eastern half.

The sea-level pressure pattern closely paralleled climatology except for a trough of low pressure that normally extends from the Icelandic Low to the Barents Sea. High pressure over the U.S.S.R. disrupted this trough. The Icelandic Low was normally located near 60°N, 25°W at 996 mb. This was 5 mb lower than the mean (fig. 25).

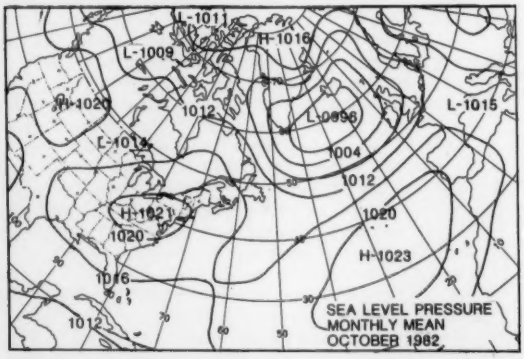


Figure 25.-- Mean sea-level pressure, October.

The Azores High at 1023 mb was near 35°N, 20°W, about 500 mi northeast of its normal position. A 1021-mb High was centered over West Virginia. There also was a 1021-mb High over the Sea of Azov.

There were five anomaly centers that directly affected or reflected the marine weather. The two major ones were a minus 7 mb center near Ireland and a plus 4 mb center west of Gibraltar. A minus 3 mb center was east of Norfolk and south of Newfoundland. There were two positive centers over the east coast of North America, a 3 mb near Cape May and 5 mb near Hebron, Labrador.

In the upper air at 700 mb there was an anomalous Low about 300 mi east of Kap Farvel. There was a long-wave trough east of and parallel to the U.S. East Coast. There was another long-wave trough that extended southeastward to Italy. There was strong zonal flow between the troughs from 35°N to 55°N.

Tropical storm Ernesto was the last tropical cyclone of the year.

Some climatology. On October 9, 1903 a severe coastal storm struck New York City with 11 in of rain and the Passaic Valley of New Jersey had 15 in during 24 hr. On October 20, 1770 a great storm struck eastern New England causing extensive damage and the highest tide in 47 yr.

Extratropical Cyclones. The first week started with a large storm that originated in September. By midweek there were multiple low-pressure centers with a large blocking HIGH over the U.S.S.R. By the end of the week there were two large weak LOWs on each side of the northern ocean with a dog bone shaped HIGH between them with a center over Iceland and near 40°N, 22°W.

During the second week the HIGH broke down and LOWs and frontal waves predominated with the first significant storm developing. By the end of the week two major storms were occurring.

As the major storms dissipated during the third week, multiple LOW centers remained. High pressure was building south of 40°N.

Frontal waves moved along the northwest side of the HIGH in the fourth week as it weakened and moved south. A major storm developed off the U.S. East Coast and another over the central ocean. The last of the month high pressure moved off the U.S. East Coast with another HIGH over the Balkans.

Monster of the Month--This first storm can be traced from a LOW over Nevada on the 4th. It took a sine wave path north of the Great Lakes, then swung southeastward crossing the east coast over Rhode Island on the 9th as an open frontal wave. It started to intensify over the warmer water on the 10th. Many gales up to 45 kn were being reported and the BUTTON GWINNETTE (40°N, 62°W) had 43-kn northeasterly winds with 26-ft seas. The NORDKAP (41°N, 68°W) was reporting 55-

kn winds at 1200. It appears that the ATARI suffered heavy weather damage from this storm on the 10th on a voyage to New York. There were several reports over 50 kn on the 11th. The U.S. Coast Guard cutter VIGOROUS near 40°N, 66°W had only 40-kn winds but the waves were 28 ft. Several other ships had waves over 20 ft.

At 1200 on the 12th the storm was 982 mb near 35°N, 57°W and turning northeastward. The winds were generally gales and waves under 20 ft, but there appeared to be an area of very severe weather northwest of the center. The ZIM HOUSTON (39°N, 61°W) reported 70-kn winds at 0000 and 55-kn with 26-ft waves at 0600. By 1200 the winds were 45-kn with 25-ft waves. The KALIDAS (38°N, 59°W) was in the same area and reported 60-kn winds at 0000.

The stronger winds were mostly gales on the 13th and 14th. By 1200 on the 15th the storm was 976 mb near 49°N, 28°W. The storm was intensifying again and there were several reports of winds near 50 kn and waves over 20 ft. By the 16th a second center had formed south of the original center and tightened the gradient. It was now a very severe storm with several reports of 60-kn winds and 41-ft waves. The CIROLANA (46°N, 17°W) found 60-kn winds and 39-ft waves. The FEDERAL MAAS (53°N, 25°W) found 41-ft seas. The winds and waves were again decreasing on the 17th but the ROYAL PRINCE (48°N, 8°W) was sailing with 49-ft swells on her starboard bow. Waves between 50 and 70 ft swept over the drilling platform WESTERN APOLLO II in the North Sea Beatrice Oil Field. Seven workers were swamped and injured. They were evacuated by helicopter to a hospital. Ten others were also evacuated (fig. 26).

Figure 26.-- The storm is centered over northern Ireland on the 17th.

On the 18th another center formed near Iceland and became the primary center at 966 mb on the 20th. The large circulation was still present and gales and high waves were also present. The storm moved northeastward over the Norwegian Sea and finally after 20 days dissipated.

This storm formed on the 10th about 550 mi east of the storm above on its warm front. It appeared to have been triggered by a tropical depression that drifted northeastward. It raced eastward under the zonal upper air flow. On the 12th it slowed and deepened and was 974 mb by 1200. The TAKASAKA (54°N, 21°W) registered 974.1 mb pressure with 50-kn northwesterly winds and 20-ft seas. On the 13th LIMA had gales and waves up to 26 ft while ROMEO had winds up to 46 kn and waves as high as 33 ft. Several ships including the DART CONTINENT (58 kn) had winds over 50 kn. She had 43-ft swells. The PAN WESTERN (49°N, 11°W) nearby reported 52-ft swells from the west. ROMEO had 26-ft seas on the 14th. The LOW was 976 mb over the North Sea. On the 15th it was no longer of concern except possibly over the Baltic Sea.

Several ships were damaged by this storm. The CORTEGADA grounded on the north coast of Spain. The SUHADIWARNO PANJANG had high seas smash the forward store hatch cover in the English Channel off Ushant. The HYDO struck the SUMADIJA while trying to dock at Havre.

The plains of Kansas spawned this storm on the 19th. It passed over Lake Michigan on the 20th with heavy rains and snow. The winds gusted to 40 mi/hr on Lake Michigan and were 50 mi/hr along the shore of Lake Erie in western New York. It was over the Labrador Sea on the 22d. There were a few gales. On the 23d the storm was near Kap Farvel. The ARCTIC (59°N, 45°W) reported 57-kn westerly winds with 21-ft swells. The SKAFTAFELL (60°N, 39°W) had 52 kn and the EASTERN GIANT (54°N, 44°W) had 33-ft swells. On the 24th two Icelandic fishing vessels reported 60-kn winds near 62°N, 14°W. The LOW was stalled near Kap Farvel and was absorbed on the 26th.

This LOW formed in an inverted trough off Miami Fla. on the 24th. The EDGAR M. QUEENY and GYPSUM KING both near 33°N, 78°W, had 31-ft waves and 52-kn northerly winds respectively. Wind speeds of 50 mi/hr were measured at Wallops Island, Norfolk, Va. and at Cape Hatteras. There were wind gusts to 63 mi/hr along the North Carolina coast. Buoy 41001 measured 28-ft seas. At 1200 on the 25th the 1000-mb LOW was over Cape Hatteras (fig. 27). Winds up to 50 kn and waves up to 26

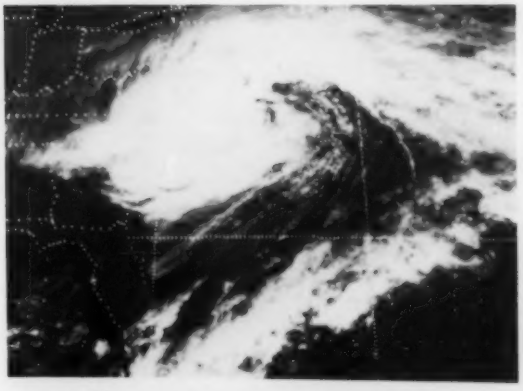


Figure 27.-- A severe storm off Cape Hatteras, where else.

ft were found by ships traveling along the coast. Coastal areas were being drenched with heavy rain, beaches suffered heavy erosion.

The storm split into two centers on the 26th and weakened it enough that it never recovered. Both centers moved eastward and dissipated at sea.

This storm sank or damaged several sailboats and one chartered fishing boat. Five bodies were recovered and three were still missing when a wave smashed into and overturned the JOAN LE RIE III 8 mi off Point Pleasant, N.J. on the 24th. Several beach houses were destroyed along the beaches of North Carolina and a state road was closed. High tides and strong winds occurred all along the Atlantic coast. Luckily this storm did not bring snow as one did to New York City in 1859 when it was blanketed by 4 in. The ALMEDA STAR and ATLANTIC suffered weather damage as they sailed southward from New York.

This storm formed at sea as a frontal wave and without ship reports would not have been detected, at least, not at this time. By 1200 on the 25th it was 973 mb near 50°N, 30°W. The NEDDRILL II had 50-kn winds in the southwest quadrant. At 1800 A SHIP (46°N, 35°W) reported 55 kn and 20 ft waves. Twelve hours later, at 0000 on the 26th the storm had deepened to 958 mb. The TORRENT at 51°N, 18°W had 64-kn southerly winds driving 34-ft waves. By 0600 LIMA was reporting 55-kn northwesterly winds with 21-ft seas. ROMEO was riding 30-ft seas. The storm was near 60°N, 18°W at 1200, and LIMA now measured 57-kn westerly winds and 30-ft seas. There were many reports of winds over 40 kn, particularly from the platforms in the North Sea. A ship southwest of Lands End reported 26-ft seas. The LINCOLNBROOK lost two containers overboard near 57°N, 07°W at 2145.

At 0000 on the 27th the 960 mb storm was over the east coast of Iceland (fig. 28). The VER off the west coast reported 60-kn northeasterly winds. The SLETTBAKUR (62°N, 25°W) also had 60-kn at 1200. Only the more northern platforms were now reporting gales. Another LOW was moving through the southwest quadrant and the storm weakened rapidly. CHARLIE had 20-ft seas on the 28th. The storm disappeared on the 30th over the Greenland Sea.

Figure 28.-- A new center is located near 59°N, 22°W.

Casualties--The FEDERAL ELBE suffered ice damage on October 2 on a voyage from Nanisivik. The following ships had problems in fog: EARL W. ROSE, PETITE FORTE, SCANVIK, EKSUND, TRANS BALTIC, JAN, GRANO, PENSACOLA, JIAN DE, and ZHELEZNOVODSK.

The following ships suffered heavy weather damage during the month. Generally not enough information was available to identify with a specific storm. They were the floating drydock No. 622, OVE SKOU, CIUDAD DE SEVILLA, AEGEAN SPIRIT, BIRGIT JURGENS, UNITY II, PAMELA, ASPEN, TADEUSZ KOSCIUSZKO, PARALOS, EYUPLER, MARATHA ELEGANCE, AGRILIA, CSOKONAI, SOUTHERN DIAMOND, REGENT MAYFLOWER, IRIS, MERSINIDI, CORTEGADA, STAR RIVER, MURREE, VICTORIOUS, GL 142, HELLENIC EXPLORER, and CORSICA NOVA.

Other Casualties--The CHIOS MERCHANT sank near 29°S, 05°E after being holed in a storm. The KOWIE grounded at Sao Francisco du Sul. The FRANCOISE lost containers overboard in the Parana River in gusty winds.

WEATHER LOG, November 1982--The storm tracks this month were dispersed both in space and direction. There were no well-defined primary tracks except possibly from the central plains states, across the Great Lakes and into the Labrador Sea. There were two storms over the Mediterranean Sea. There were four anomalous storms in the vicinity of Bermuda that formed south of the Island. There was also an anomalous storm that moved south from south of the Azores, then east, then west, the last of the month.

The monthly mean sea-level pressure was much more intense this month than normal. The Icelandic Low was 11 mb deeper than normal and the Azores High was 7 mb higher than normal. There were two centers to the Icelandic Low, a 992 mb near 63°N, 28°W and a 993 mb near 68°N, 01°E. Both were near their climatic position. The Azores High was 1026 mb near 38°N, 39°W, about 40 mi northwest of its normal position. There was also an anomalous 1024 mb high over Va. (fig. 29).

There were three minus 12 mb anomaly centers connected with the Icelandic Low. One was about

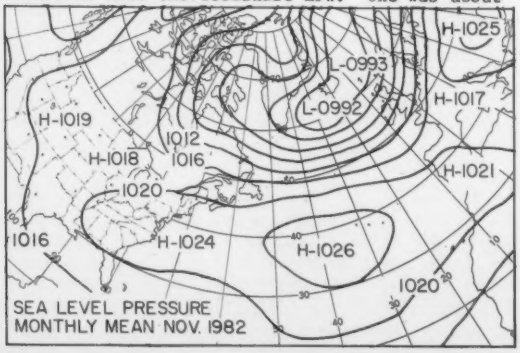


Figure 29.-- Mean sea-level pressure, November.

300 mi southwest of Keflavik, another near 67°N, 02°E, and the third over Nordkapp. There was also a minus 8 mb center over the Davis Strait. The latitude belt near 40°N was all positive anomalies. There was a plus 6 mb off Delaware Bay, a plus 7 mb over the central ocean (38°N, 43°W), a plus 5 mb west of Casablanca, and a 7 mb over the Balkans.

The upper-air gradient at 700 mb was also much tighter than normal. The normal height difference between 40°N and 60°N along 40°W is 252 m. This month it was 395 m. The normal long-wave trough over eastern North America was retrograded westward, and the normal long-wave trough over western Europe was also further west off the coast. The latitude belt between 40° and 60°N was zonal. The anomaly centers closely matched the surface centers.

There were no tropical cyclones this month.

Some climatology. On November 12, 1968 a severe coastal storm produced high winds up to 90 mi/hr in Massachusetts and record early snows from Georgia to Maine. On November 26, 1888 a late season hurricane brushed the U.S. East Coast with heavy rain and gale-force winds. It passed over Cape Cod and crossed Nova Scotia. On November 27, 1898 the Portland storm raged across New England with high winds and heavy snow. Twenty seven in fell at New London, Conn. and 12 in at Boston. Winds gusted to 72 mi/hr at Boston. The storm was named after the passenger ship PORTLAND which foundered off Cape Cod with loss of all 200 aboard. It also wrecked 55 other vessels with about 200 more casualties.

Extratropical Cyclones--The weather systems this month were more severe than normal. The month started out with high pressure over the mid-latitudes and multiple small LOWs to the north and west. At the end of the week a large LOW had developed off the Bay of Biscay with the Azores High over the central ocean. There was an omega block in the upper air off the coast of Europe.

There were some severe LOWs the second week along with a strong Bermuda-Azores High across the midlatitudes.

The third week a 1041-mb HIGH drifted eastward with another moving off the U.S. East Coast. There were several severe LOWs. The end of the week there were high pressure over southern Europe and the western ocean. The LOWs were along 60°N.

During the fourth week a LOW drifted northward along 60° to 65°W. At midweek storms built off Ireland and Nova Scotia with high pressure south of 50°N. Later a large LOW built over Baffin Island. At the end of the month there was a storm over the Mediterranean.

Monster of the Month--This LOW formed east of Belle Isle on the 4th as another dissipated over Labrador. It moved rapidly eastward across the top of a large HIGH and south of a LOW between Kap Farvel and Iceland. It was still a weak circulation at 1200 on the 5th but it compressed the gradient between it and the HIGH so that the TILLIE LYKES (41°N, 34°W) found 51-kn winds and 20-ft waves. On the 6th ROMEO had 20-ft seas. By 1200 the circulation had exploded and the storm was 968 mb near 47°N, 17°W. The center was

Figure 30.-- The storm is centered off Cape Finisterre on the 7th. Another center has formed near Ireland.

over ROMEO which had a pressure of 969 mb and 26-ft seas. The SCHWABENSTEIN (43°N, 17°W) measured 72-kn westerly winds. The JALARAJAN (35°N, 25°W) measured 62 kn from the northwest. There were other storm wind reports and waves up to 33 ft. The high winds and waves continued into the 8th (fig. 30). Another center had formed to the north and moved northeastward. There was a large 1035 mb HIGH over western Russia and this resulted in high southerly winds over the North Sea. By the 9th the original LOW had disappeared over the English Channel but the second continued northward.

This storm caused extensive damage to ships, yachts, fishing vessels, and property in Portugal, Spain, Italy, and France. High waves crashed inland on low-lying coastal areas and heavy rains caused extensive flooding. The preliminary death toll was 15 in Spain, 12 in France, 4 in Portugal, 3 in Andorra, and 1 in Italy. Thousands were injured. Among the casualties were five small craft in Leixos harbor. Among the ships that grounded or contacted each other were the KRISTINE MAERSK, MOTAGUA, MAZATEC, SAMIR, and WEST BAY I. The PERLA had heavy weather damage off Portugal. The ATLANTIC HORIZON lost part of the deck cargo in an encounter with severe waves. Thirteen Britons were rescued by the FEDRO GLADKOV when the FREMAD sank off Cape Finisterre. A railroad bridge and a highway bridge collapsed in northern Italy. Thousands were without power as the storm blew trees onto power lines. Highways and rail lines were blocked. Andorra was isolated by high water. Winds as high as 90 kn were reported in some areas.

This storm originated as a frontal wave between two high-pressure cells on the 7th. The storm passed south of CHARLIE at 0000 on the 9th. A ship near 46°N, 43°W had 40-kn winds and 20-ft seas. As with the other storm, this one deepened drastically in 12 hr to 957 mb near 55°N, 28°W at 1200. The REYNOLDS (50°N, 25°W) measured 56-kn winds and 30-ft waves. The BAMSA DAN measured 72-kn winds from 030° at 59°N, 24°W. At 0000 on the 10th LIMA had 58-kn west winds with 960 mb pressure and 23-ft seas. The LOW was 948 mb. Other ships were having storm-force winds and waves up to 30 ft. There were gales over the North Sea. The

storm dissipated very quickly on the 11th.

Observations from CHARLIE, A SHIP, ECKE, and 7JKS identified the formation of this frontal wave on the analysis of 0000 November 11. At 1200 the DART CANADA was about 100 mi south of the 982-mb center and measured 69-kn westerly winds and 15-ft waves (fig. 31). On the 12th ROMEO had 20-ft waves. At 1200 the ESSO ABERDEEN (57°N, 08°W) measured 52-kn winds and 33-ft waves. By 1200 on the 13th the 954-mb storm was northeast of Iceland. MIKE had 42-kn winds at 0600. The AMERICAN ALLIANCE was in the southern edge of the storm with 44-kn northwesterly winds and 21-ft seas. JAN MAYEN north of the storm center had 50-kn northerly winds. On the 14th the DART BRITAIN (49°N, 20°W) measured 50-kn winds from the northwest. On the 15th the storm was no longer of concern.

Figure 31.-- The Sun angle is so low north of 50°N that visual images do not show well. The storm is at 52°N, 20°W.

A LOW moved across the Labrador Sea and against the southwest coast of Greenland. It traveled northward up the west coast and the front broke up over the ice cap. As the southern part of the front reached the east coast a new LOW formed, as usually happens. By 1200 on the 15th the storm was 958 mb south of Angmagssalik. The JOHAN PETERSEN (62°N, 23°W) had 44-kn winds from the southwest and 23-ft seas. The INGOLFUR ARNARSON (64°N, 25°W) had southwesterly 52-kn winds with 963-mb pressures. At 0000 on the 16th the JOHAN PETERSEN had 68-kn winds and 30-ft seas. At 1200 the KNUD MAERSK reported 78-kn southerly winds and 21-ft seas in the Skagerrak. The LINDA DAN (59°N, 15°W) had 60-kn westerly winds and 41-ft seas. The PROTSIONE (63°N, 25°W) had 54-kn and 39-ft seas. Many ships reported winds over 40 kn. The LOW was 944 mb. The high winds and waves continued into the 17th but the LOW quickly deteriorated later in the day.

Northern Michigan gave birth to this storm late on the 14th. It started intensifing as it moved across Nova Scotia early on the 16th. The AMERICAN ALLIANCE (46°N, 47°W) found 21-ft southerly swells at 1200 (fig. 32). The RIGG at 44°N, 60°W measured 60-kn westerly winds and

Figure 32.-- The storm is centered south of Newfoundland. The cellular type clouds southwest of the center indicate instability.

15-ft seas while nearby the LFMO measured 54-kn winds and 34-ft seas. By 1200 on the 17th this was a vicious 964-mb storm near 54°N, 40°W. The AMERICAN ALLIANCE (45°N, 52°W) 12 hr earlier had 60-kn winds and 33-ft waves. The HUDSON (50°N, 43°W) measured 70-kn winds from 240°. The Q.E. II (50°N, 35°W) measured 55-kn from the same direction with 33-ft seas. High winds and waves continued into the 18th. LIMA measured 60 kn and 26-ft seas and the EGLANTINE (53°N, 30°W) measured 42-ft seas. CHARLIE also had 41-ft waves, and LIMA had 36-ft. The GCMC (54°N, 18°W) reported 60-kn winds, 16-ft seas and code 35 (57-ft) swell waves.

At 1200 on the 19th the storm was 968 mb near the Shetland Islands. There were gales along the coasts and LIMA still had 26-ft swells. The observation stations in the North Sea were mostly reporting winds in the 40's with a few 50's and waves up to 33 ft. By the 20th the LOW was over Norway and no threat.

The ships concerned with this storm were on the Great Lakes. November can be one of the worst months on the lakes for bad storms. The LOW developed over Lake Winnipeg early on the 20th and intensified rapidly. At 1200 the BURNS HARBOR measured 40-kn southeasterly winds on Lake Superior. By 1800 the JOHN G. MONSON measured 32 southerly winds on Lake Michigan. On the 21st the PHILIP R. CLARKE measured 49-kn westerly winds on Lake Superior. The storm was 973-mb near Fort Severn on Hudson Bay at 1200. By the 22d the strong circulation was north of the Great Lakes. The storm curved northward, then westward over the Gulf of Boothia, then southward again to dissipate.

This storm traveled from near the Tropics to near the Arctic. This was one of the anomalous storms that formed south of Bermuda. It was

first analyzed on the 21st. It tracked northward, then westward late on the 22d and curved eastward through the south then northward again all on the 23d. At 1200 on the 22d, the Y5RK measured 64-kn easterly winds near the center in a heavy rain shower. The DONAX (35°N, 68°W) had 45-kn winds from the northeast on the 23d. The D.C. COLEMAN measured 63-kn westerly winds at 1800 south of the center.

On the 25th this LOW combined with another LOW that moved up the Saint Lawrence River. There were several reports of high winds. The NORWHAL (46°N, 63°W) measured 60-kn westerly winds. The RIGG at (47°N, 48°W) measured 52-kn southerly winds with 17-ft seas. A ship near 45°N, 53°W had 23-ft seas. At 0600 on the 26th the 972-mb storm was over Kap Farvel. It was part of a larger cyclonic circulation centered over Baffin Island. The ship Y4DM was off Hopedale, Labrador reporting westerly winds near 50 kn with waves near 25 ft each 6 hr. The VAN DYCK (52°N, 48°W) had 45-kn winds with 33-ft swells. The INLAND (55°N, 31°W) had 52-kn winds with 26-ft seas. CHARLIE measured 21 ft. On the 28th another storm absorbed this one.

This storm formed near Ottawa on the 26th. It raced eastward and was 984-mb near 55°N, 40°W at 0000 on the 28th. CHARLIE and a ship nearby had gales and 23-ft seas. The FARMSUM (46°N, 39°W) was east of the cold front with 50-kn southerly winds. By 1200 the storm was 956 mb near 60°N, 33°W. The MAELIFELL (60°N, 36°W) measured 52-kn winds. Ships east of the front were reporting waves of 20 ft or more. At 0000 on the 29th a frontal wave was over the PORYV (50°N, 29°W) and she had 20-ft seas and 25-ft swells. The ATLANTIC SAGA (50°N, 27°W) measured 58-kn winds. The CIROLANA had 48-kn winds from the south with 26-ft swell waves. The original LOW was quasistationary on the southeast coast of Greenland and dissipated on the 30th as the front continued moving eastward.

Casualties--Many ships suffered heavy weather damage this month. For most it was not possible to identify the storm associated with the damage because of lack of places or dates or both. These casualties were associated with fog: BLUE CIRCLE VENTURE, RABUNION I, INTEGRITY II, MERLE, and VOLGOLES. These ships sank: NISSOS ANDROS, DONQUESTO, and ONEDIN. These ships dragged anchor, grounded, or collided in high winds: LAMONE, GIAMBATTISTA VENTURI, RADESHEIM, CAPO ROSSO, GUNES METE, STAR ANN, MARTHA L., VALENTINA FRIAS, CARTHAGO-NOVA, POSEIDON, ALEXANDER K., NAVICO, and ARCTIC CRUSADER.

These ships listed heavy weather damage: AUSTRALIAN VENTURE, CAPE FEAR, CIUDAD DE SEVILLA, DIEGO, DORTHE OLDENDORFF, EL LOUD III, ESRAM, ESSO JAPAN, FAST TWO, GOLFO DE TONKIN, HELENE CLIPPER, HINGLAJ, IPPOLITOS, IRAN MEEAD, JAPAN CANELA, KHAIRPUR, LA CORDILERA, LOK VIHAR, MAKRAN, MALYY TAYMYR, NABSTONE, POMALAA, RIO MAYABEQUE, ROSTOCK, RUBENS, SALEM N., SOJBERG, SUMATRAS, SUPER SERVANT I, VOLLSOY, AND WINDFROST.

WEATHER LOG, DECEMBER 1982--The low-pressure centers were primarily north of latitude 50°N while over water, and over northeastern waters when they became severe. The principal track was from Newfoundland to Iceland. There were three storms over the Mediterranean Sea. There were three cut-off LOWs far south of the main storm tracks. A principal track from the Maritime Provinces northward into Baffin Bay did not exist. The storm track over the Great Lakes was from the southwest rather than the northwest as climatology indicates.

The monthly mean sea-level pressure chart indicated that there were either more LOWs or they were deeper than normal or both. The track chart indicates they were deeper. The Icelandic Low was 990 mb, 10 mb deeper than normal, midway between Kap Farvel and Iceland. There was a 992-mb center west of Nordkapp. The Azores High was 1030 mb, 9 mb higher than normal, near 37°N, 19°W. High pressure centers over Virginia and near Bermuda were 1024 mb, 4-mb higher than normal. The gradient between the Icelandic Low and the Azores High is normally 21 mb but this month it was 40 mb, almost double (fig.33).

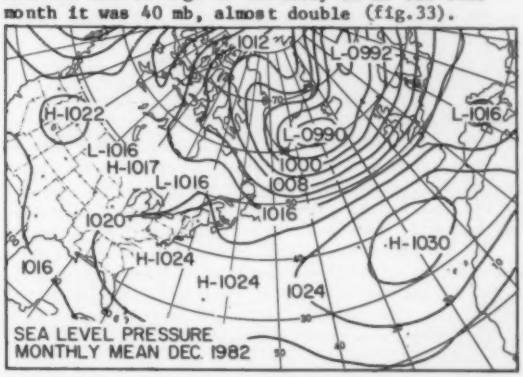


Figure 33.— Mean sea-level pressure, December.

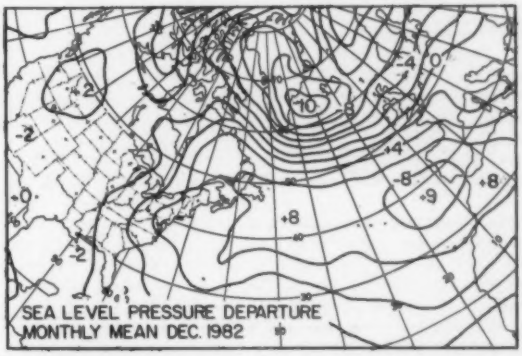


Figure 34.— Departure from normal of sea-level pressure.

The anomaly pattern over the ocean (fig.34) was two large centers, one negative and one positive. The Icelandic Low produced a minus 11 mb center near 62°N, 30°W. The Azores-Bermuda High produced a plus 9-mb center west of Gibraltar and two plus 8-mb centers over the central ocean. The zero line stretched westward from the English Channel to 40°W and then curved to Frobisher Bay. There was also a minus 14-mb center north of

Nordkapp but it had little effect on the major shipping lanes.

The 700-mb height pattern was zonal between latitudes 40°N and 60°N. The gradient was also more intense than normal, 435 m versus a normal of 360 m at longitude 40°W. There was an anomalous trough from the 700-mb LOW over Baffin Island toward the surface Icelandic Low.

Some climatology. On December 10, 1946 the temperature at New York City soared to 70°F. On the 16th, 1835, New England experienced one of their coldest days of record. At noon it was -4°F at Boston and -17°F at Hanover, N.H. Gale winds were blowing out of the northwest and that night a fire destroyed the New York City financial district. In 1839 on the 22d the second of three December storms hit the Northeast. Gettysburg, PA had 25 in of snow. On the 23d, 1811, a storm hit Long Island with a foot of snow, gale-force winds, and near 0°F temperatures. Many ships were wrecked and entire crews perished. On the 30th, 1933 the temperature dropped to -50°F at Bloomfield, Vt., coldest reading for New England in modern records.

Extratropical Cyclones--The month started out with a 1038 mb HIGH over Poland that built to 1043 mb by midweek. There was also high pressure off the U.S. East Coast. There was a LOW over the Mediterranean and frontal waves between the two HIGHs. The LOWs were held well to the North. By the end of the first week the HIGH over Europe was breaking down and a severe LOW had formed.

The second week of the month the Azores High was back to normal and there were several severe LOWs. There was a frontal wave off the East Coast. By the end of the week high pressure dominated the ocean from 10°N to 55°N.

The third week a large deep LOW developed over the Norwegian Sea. The high pressure broke down and moved south and another severe LOW formed. The third and fourth weeks there were LOWs over the Mediterranean.

There was a large Azores High the fourth week and another over the U.S. East Coast. The LOWs were broken up into multiple centers. By the end of the week the LOWs had combined into single intense storms. There was again high pressure over Europe and the central ocean. At the end of the month another severe LOW had developed.

Lake Winnipeg produced this storm on the 2d. It moved across Hudson Bay into Ungava Bay at 970 mb at 1200 on the 4th. The CHARLOTTE BASTIAN (51°N, 49°W) measured 60-kn southerly winds with 13-ft seas. The RIGG at 47°N, 49°W measured 66 kn south-southwest winds and 17-ft seas. The DART ATLANTICA (46°N, 51°W) had 52-kn winds at the warm front. The QUEEN ELIZABETH II (49°N, 41°W) measured 64-kn winds, 31-ft seas, and 20-ft swells. At 0000 on the 6th CHARLIE was near the apex of the occlusion in the warm sector with 20-ft waves. At 1200 the storm was 974 mb near Kap Farvel. The SEA-LAND INDEPENDENCE (47°N, 32°W) encountered 45-kn westerly winds and 20-ft waves. The AMERICAN ALLIANCE was near 49°N, 07°W on the 7th with 55-kn southwesterly winds and 33-ft waves. High gales were blowing over the North Sea on the 8th. The LOW had split into two centers. The KOLN EXPRESS (55°N, 27°W) measured 64-kn winds and 17-ft seas.

A frontal wave had entered the southwest quadrant and the storm consolidated and intensified on the 9th around a new center near 59°N, 28°W. There were many high winds and waves. The NIKOLAI KOPERNIK (44°N, 36°W) had 36-ft swells. The KOLN EXPRESS (53°N, 36°W) measured 50-kn winds from the west, 20-ft seas, and 39-ft swells. CHARLIE measured 64-kn winds and 36-ft seas. On the 10th the waves were 38 ft, and ROMEO had 39-ft waves. The WLAW had 62-kn winds near 49°N, 23°W.

On the 10th the storm again split into multiple centers. The BONITA had 39-ft swells. Many ships reported winds near 50 kn and waves over 25 ft. The CIROLANA (49°N, 11°W) measured 48-kn west winds, 13-ft seas, and 42-ft swells. CHARLIE measured 38-ft waves and ROMEO measured 39-ft waves. By the 0000 analysis of the 11th the western centers had disappeared and the primary LOW center was over Sweden. Another strong storm was south of Kap Farvel.

It appeared these ships suffered heavy weather and damage during this storm. The AMCO TRADER was following the storm eastward from the 4th to the 11th. The TUYUTI lost containers overboard off Cape Finisterre on the 10th. The ALEKSANDROUSK and KARA CAREER collided at Flushing Roads on the 10th. The ANDONI broke tow in 50- to 60-kn winds on the 10th off Newhaven. A trailer leg broke in heavy weather on the SENLAC on the 9th. The LAGO LLANQUIHAE had damage off Ushant on the 11th.

This fast developing storm formed over Nova Scotia in the col area between two high-pressure cells on the 9th. Winds up to 60 kn and waves up to 26-ft were being reported by 1200 on the 10th. SEDCO 706 (47°N, 48°W) measured 70-kn winds from the west with 20-ft seas. By 1200 on the 11th the 970-mb storm was near 56°N, 29°W. The high wind and wave reports continued. The CHEVRON BURNABY (50°N, 19°W) reported finding 57-ft swell waves. The SANKO PRESTIGE (53°N, 25°W) measured 75-kn westerly winds with 46-ft waves. CHARLIE measured 60-kn and 43-ft seas.

The 12th was another rough day for ships in the rough area of 35°N to 60°N and east of 35°W (fig.35). There were many reports of storm-force winds and waves over 30 ft. The NURNBERG EXPRESS (48°N, 20°W) measured 60-kn northwesterly winds and giant 52-ft waves. The ALINDA measured 72-kn winds near 43°N, 18°W and the CHEVRON BURNABY (46°N, 18°W) measured 44-ft seas. On the 13th the area of high winds and waves narrowed down to the Bay of Biscay and the coast of Portugal. Among others the MAUMEE (47°N, 11°W) found 60-kn northerly winds, 26-ft seas, and 44-ft swells. The FRANCIS GARNIER (44°N, 08°W) found only 24-kn winds but her waves were running 38 ft. Late on the 13th the storm center moved ashore and the winds died down but high swell continued. The DGWC was off Morocco (32°N, 10°W) and found 39-ft swells.

The UNITED BOUNTY dragged anchor and went aground on a breakwater on the north coast of Spain The BREEKADE, CAVALLY, ESSO DALRIADA, and MABROUK suffered heavy weather damage. The CONDOR, MANILA and NOSIRA MADELEINE had cargo shift and the MANILA lost 10 containers overboard.

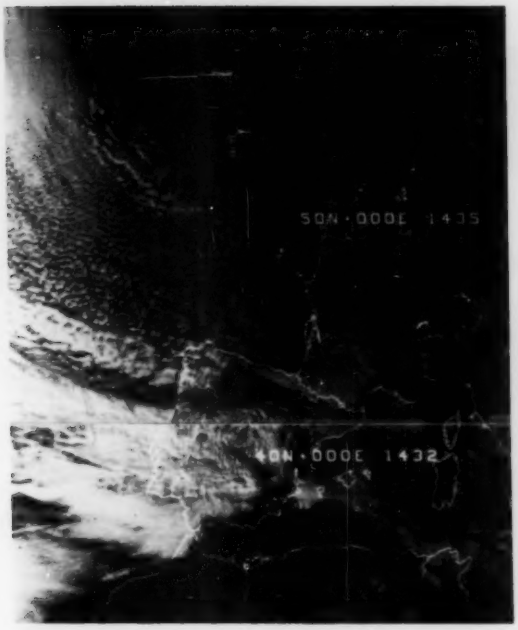


Figure 35.-- The unstable weather associated with these innocuous looking clouds was a headache for many ships.

Starting on the 11th a series of frontal waves began forming over the Gulf Coast and moving eastward. It was very hard to trace any specific wave from one chart to another. On the 12th the frontal waves had moved to the East Coast (fig. 36). There were some gale reports with waves up to 25 ft. On the 13th the 9VEY measured 57-kn winds from the north. The AMERICAN ALLIANCE measured 50-kn winds, 15-ft seas, and 30-ft swells. On the 14th the front was being tightly squeezed between two large HIGHs. The AMERICAN ALLIANCE still had 50 kn winds. On the 15th the ROSELINE (28°N, 70°W) had 31-ft waves from the

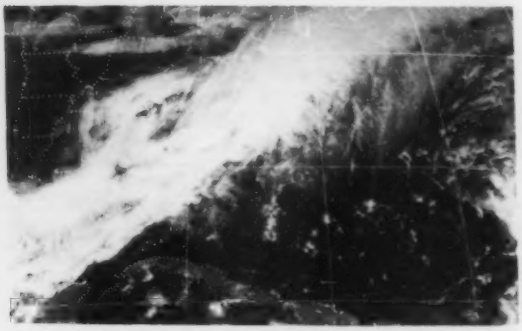


Figure 36.-- The front parallels the U.S. East Coast. The surface waves are obscured by high clouds. They can be analyzed only with the aid ship observations.

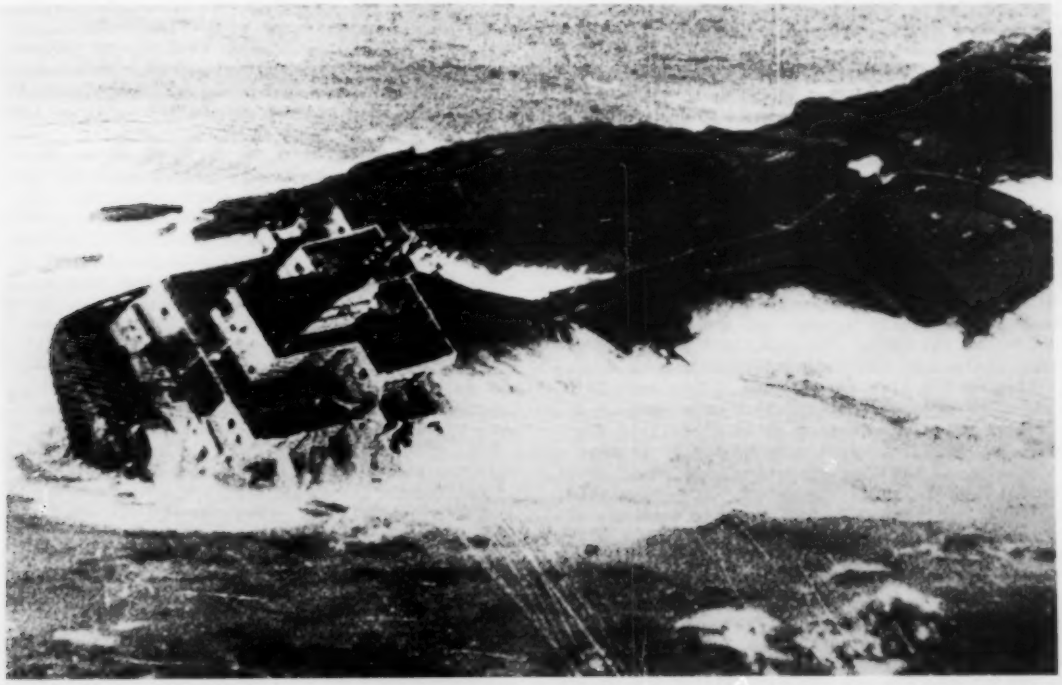


Figure 37.-- The CAREBEKA 8 was blown hard aground on rocks off San Ciprian Harbor, Spain on the 23d by strong winds and 16-ft waves. At this time the Captain was still aboard but attempts were being made to rescue him. Wide World Photo.

Figure 38.-- The EUROPEAN GATEWAY lies on her side off Harwich, England on the 20th after a collision with the SPEEDLINK VANGUARD. Wide World Photo.

northeast and the NORDLAND (36°N, 50°W) east of the front had 30-ft southerly swells. Frontal waves continued but weakened to insignificance.

The trawler LOIS JOYCE was driven aground in 35-to 40-kn winds gusting to 70 kn with 10-ft seas at Oregon Inlet and capsized. The storm dumped heavy snow over the East Coast from Virginia to New England. Winds gusted to 44 kn at Nantucket.

Monster of the Month--A low-pressure system moved northeastward out of Texas on the 14th and up the St. Lawrence River valley on the 16th. On the 17th it was squeezed by two large high-pressure cells and a new LOW center formed off Labrador. This center quickly intensified and gales were blowing on the 18th. The SUDURLAND and FRITHJOF south of Iceland found easterly winds over 65 kn. At 1200 on the 19th the LOW was 932 mb near 60°N, 15°W. The strong winds and high seas were increasing. LIMA measured 64-kn winds from the southwest and 31-ft seas. Romeo had 30-ft seas.

At 1200 on the 20th the storm was 944-mb over the Shetland Islands. There were many high wind and wave reports. One of the higher ones was 60 kn measured by the WINTER SUN (46°N, 07°W), with 36-ft waves. Two ships found 49-ft swell waves, the WILD GANNET and the VRPD, both near 46°N, 08°W. ROMEO still had 30-ft seas. The FRITHJOF (61°N, 15°W) had 60-kn winds from the north and 30-ft seas. The many platforms in the North and Norwegian Seas were having strong gales or higher. On the 22d the LOW was rapidly filling and moving northward along the coast of Norway.

Rains and high tides from this storm, ones preceding it and more later in the week caused widespread damage along the North Sea coast, France, Germany, and Italy. Many rivers flooded including the Seine. Highways and railroads with bridges were flooded and damaged. Many homes flooded and thousands of people driven from their homes.

This storm also took its toll of ships. The BETTY S. sank off Bordeaux in reported force 12 winds. The AFRAN LEEWARD, AHMOS, BRITISH ENTERPRISE FIVE, CEDRA SUN, MING SUMMER, TARBELA, and TRISTAR had damage. The ROXANE KERSTEN lost six 40-ft containers overboard in St. Georges Channel. The IBN ROCHD and MATINA had damage while docked. The CAREBEKA-8 (fig.37) was blown aground off San Ciprian harbor, Spain.

The worst catastrophe of all was the collision of the EUROPEAN GATEWAY and the SPEEDLINK VANGUARD off Felixstowe. The EUROPEAN GATEWAY (fig.38) capsized and sank in shallow water. Five people were killed and one crewman was missing.

This LOW started over at 1,000 mi off the coast of California and raced across the western mountains and plains. Christmas day it was west of Chicago. Detroit had a thunderstorm. The storm passed over Belle Isle late on the 26th at 976 mb. The WEST (47°N, 49°W) measured 50-kn southwesterly winds. The LASH ATLANTICO measured 48-kn winds, 28-ft seas, and 33-ft swells. The MAYAGUEZ (39°N, 54°W) had strong gales and waves of 43- and 48-ft on the 27th and 28th.

At 1200 on the 28th the storm was 960 mb near 64°N, 34°W. A 997-mb frontal wave was near 50°N,

33°W. There were gales and waves up to 20 ft behind the front. On the 30th the storm was over the Greenland Sea.

New Mexico produced this storm. On the 29th it was west of Goose Bay and the southwest flow was over the water and the drilling rigs on the Grand Banks were reporting 40- to 50-kn winds. A supply ship in the area reported 23-ft seas. At 1200 on the 30th the 976-mb storm was near Kap Farvel. The OIPG (34°N, 30°W) measured 58-kn winds. On the 31st two ships far apart had light winds but high seas. The NIKKO MARU (56°N, 25°W) had only 26-kn with 17-ft seas, and 33-ft swells. The SOULI (54°N, 53°W) had 27 kn with 35-ft seas. MIKE had 40-kn southerly winds. At 6°C it must have felt like summer.

The storm picked up strength on New Years. CHARLIE and LIMA had 43- and 48-kn winds with 21-ft seas. The NIKKO MARU (56°N, 26°W) had 33-ft swells. At 1800 the GRONLAND (59°N, 24°W) reported 60-kn winds and 43-ft waves which continued into the 2d. A frontal wave was moving through the southern periphery bringing gales and waves over 20 ft. Flores in the Azores indicated 55-kn winds. On the 3d there were 40- to 50-kn southerly winds over the North Sea and Norwegian Sea. The PENAVEL (60°N, 02°W) somehow found 70-kn winds and 31-ft seas. The Shetlands had 40 kn. A new LOW had formed in the Denmark Strait. LIMA had gales and seas over 20 ft on the 4th as another storm approached from the southwest.

Casualties--Besides the many casualties tenatively identified with individual storms the following ships reportedly suffered from heavy weather. The accommodation platform SEAFOX 1 and the drilling platform TRANSOCEAN 4 were in distress in the North Sea on the 24th. That same day the PACIFIC TULIP found damage. The NIKOLAY TULPIN and SUBRO VALOUR had problems with fog.

The following is a list of ships reporting damage: ANDALUSIA, ANNA, ANTARES,ARTICO, ATACAMA, BARDINI REEFER, CARIGULF WARRIOR, CAP BISTI, CAST POLARBEAR, CHARALAMBOS, CHON VENT, DJURSLAND, ELGRY, GENEVE, GIORGOS K., GULF KESTREL, HAPPY FALCON, IRA, KATAWA, KARYSA, LEXINGTON, M. ISTANBUL K., OSTRA, SIRT, SUBLIFT CARIBIC, SUDESTADA, TOSCA, and XI FESTIVAL.

Beachcombers on Britany had a field day when the INA lost containers overboard with 4,200 litres of whiskey that floated ashore.

North Pacific Weather Log

October, November and December 1982

WEATHER LOG, October 1982--The cyclone tracks this month closely paralleled climatology. There were two primary paths, one running east-northeastward from east of Tokyo, turning north-northeastward into the western Gulf of Alaska, with a fork that extended eastward to the Queen Charlotte Islands. A northern primary path extended from the La Perouse Strait into the Bering Sea where it turned northward. A secondary path pointed to the Oregon-California border. Some storms wandered about the Sea of Okhotsk.

The sea-level pressure was mostly above normal. The primary Aleutian Low was 1003 mb, normally located near Montague Island, but 2 mb higher than normal. There was a 1010-mb subcenter over the Sea of Okhotsk. The primary high-pressure center was 1022 mb, 3-mb higher than normal, and centered near 40°N, 163°W. This was closer to the midocean than normal. There were the usual sub-high pressure centers across the 30° to 40° latitude belt but further north (fig. 39).

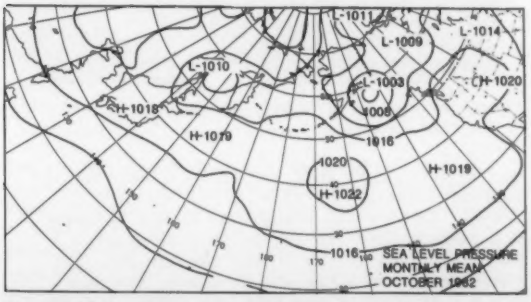


Figure 39.-- Mean sea-level pressure, October.

The primary anomaly center was plus 12 mb over Umnak Island. It extended northward to other centers over the east longitude side of the Arctic Ocean. Positive values dominated the ocean routes north of latitude 40°N and extended to 30°N along longitude 160°W. The area generally south of latitude 35°N was within a few millibars of zero.

The upper-air pattern at 700 mb was mainly zonal between 30° and 60°N. The long wave troughs were over the Sea of Japan and along longitude 145°W. An anomalous short wave trough was apparent along longitude 170°E between latitudes 30° and 50°N. The primary Low was over the Beaufort Sea with a trough south through central Alaska and along 145°W.

Typhoons Mac, Nancy, and Owen occurred over the western ocean. Hurricane Sergio and tropical storm Tara were over the eastern ocean.

Some Climatology. On October 12, 1962, probably the most damaging wind storm struck the Pacific Northwest west of the Cascade mountains. Sustained winds reached hurricane force with gusts over 100 mi/hr. More than 3.5 billion board feet of lumber were blown down, communications were severely disrupted, 48 lives were lost with damages estimated at $210 million. In 1934 on the 21st another severe wind storm struck the coast. In Washington 22 persons were killed. The winds reached 87 mi/hr at North Head. Waves were over 20 ft even on Puget Sound and Lake Washington.

Extratropical Cyclones--The first week started out with many small-weak pressure centers. These

consolidated into two large extratropical cyclones, a tropical cyclone, and a normal Pacific High by the end of the week. Beginning the second week the cyclones broke down into multiple centers again. The Pacific High moved over the Pacific Northwest and a HIGH moved over the central ocean. The last of the week the important weather systems were a tropical cyclone, extratropical cyclone, the large HIGH near 40°N, 160°W and a weak LOW replacing the normal Pacific High.

During the third week the HIGH from Asia moved to the normal Pacific High location as another HIGH moved off Asia. These were multiple LOWs both north and south of the high pressure. The high-pressure centers were the dominate feature with one 1048 mb over the Aleutians. Early in the fourth week the high pressure moved over the Arctic Ocean ridging south over the midocean. There was a large two center LOW off North America. About midweek there was a multiple center situation with two tropical cyclones. By the end of the month the ocean basin was near normal.

This first significant storm was analyzed as a frontal wave south of Tokyo on the 2d. It turned northeastward on the 4th and started intensifying. The ATLANTIC MARU (45°N, 165°E) had 45-kn easterly winds north of the center. By 0000 on the 5th the 972-mb center was near 44°N, 166°E. The CAMBRIDGESHIRE (46°N, 170°E) had easterly 54-kn winds and 26-ft swells. The QUINTANA (43°N, 168°E) winds were 46 kn with seas of 44 ft. On the 6th the TOYOTA MARU No.11 (41°N, 170°E) was fighting 45-kn winds and 30-ft swells. The SEA-LAND FREEDOM (39°N, 175°E) also had 30-ft swell waves.

On the 7th the higher winds were in the gale category but the TOYOTA MARU now had 33-ft swells on her stern. The storm was weakening by the 8th but there were isolated high swell reports, as from the CHAMPAGNE (47°N, 164°W) near the storm's center at 1800 of the 8th with 42-kn northerly winds and 26-ft swells. The storm crossed the south coast of Alaska on the 9th. A deep trough stretched southward and the SANKOSUN (47°N, 148°W) near the front had 28-ft seas and 33-ft swells. The TOYOTA MARU No. 14 (44°N, 146°W) reported 25-ft swells. The storm ended its career over the Northwest Territories on the 13th.

This storm formed as a frontal wave on the same front as the previous storm, but ahead of it over the central ocean on the 3d. By 0000 on the 5th it was 976 mb near 52°N, 149°W. The CHEVRON CALIFORNIA (45°N, 150°W) had 40-kn winds and 23-ft waves at that time. Six hours later the swell was 26 ft. A Japanese ship at 53°N, 154°W found 52-kn winds from the north. This was a large storm. It was 960 mb near 55°N, 140°W at 0000 of the 6th. Buoy 46004 measured 26-ft waves. The VPDT (54°N, 136°W) had 47-kn southerly winds and 26-ft seas. Quite a few fishing boats reported winds up to 50 kn with gusts to 60 kn. Among them were the WOLDSTAD, JEFFERY FOSS, ELDAN, ARCTIC LADY, and MARS. There were waves near 20 ft behind the front as it approached the coast north of Cape Blanco. The storm weakened rapidly as it crossed into Alaska but managed to survive and enter the Beaufort Sea.

A combination of two LOWs produced this storm. The first one formed some 1,200 mi northeast of typhoon Mac on the 7th. On the 8th a Japanese ship reported 40-kn winds in the northeast quadrant and another in the southeast quadrant reported 20-ft swells from the northwest, 180° to the wind and sea waves. On the 9th another LOW formed 400 mi northeast of this center. By the 10th the two centers had consolidated a large storm. Generally the maximum winds were gales but the DARIN MARU (47°N, 170°W) was slightly north of the center of the first LOW with winds of 60 kn from 090°, 16-ft seas, and 26-ft swells at 0600. Fishing vessels on both sides of the Alaska Peninsula reported high winds. The NORSEMAN had gusts to 60 kn. The JUSTINE FOSS had 50 kn with 20- to 25-ft seas and swells.

By 0000 of the 11th the second LOW was the primary and deeper circulation center at 958 mb near 47°N, 173°W (fig. 40). During the day several ships had winds near 50 kn and waves near 30 ft. The Japanese 8KSB had 56-kn winds near 47°N, 152°W and the GVCE found 39-ft swells near 50°N, 175°W. The PRESIDENT FILLMORE (48°N, 175°E) had only 35-kn winds but the swells were 31 ft. On the 12th the NEWARK (56°N, 137°W) had southerly 41-kn winds and 23-ft seas while the DISCOVERER (54°N, 165°W) had 46-kn northerly winds with 20-ft seas. The LOW crossed the south coast of Alaska on the 13th and was no longer a threat.

Figure 40.-- The original LOW can not be identified in this image.

On the 18th there were two large HIGHs over the northern ocean, near 45°N, 160°E and 50°N, 165°W. An inverted trough had formed between the eastern HIGH and the California coast. A LOW had formed in the trough earlier but dissipated when a new one developed farther north. At 0000 on the 19th the TECTUS and the

GOLDEN GATE BRIDGE, both near 42°N, 152°W, had winds of 50 kn and the former 20-ft swells which increased to 23 ft later. The TITUS (39°N, 154°W) had 40 kn with 34-ft swells on the 20th. These observations were in the strong gradient in the northwest quadrant between the LOW and the HIGH. The HIGH was now 1046 mb near 55°N, 175°W. Another small cyclone circulation had formed to the north near Kodiak Island. On the 21st the winds were gales except there was a 50-kn wind reported near 54°N, 161°W by the LIAO HAI.

There were several ships along the north coast of Alaska reporting winds up to 50 kn. Some were reporting every 3 hr. The VXGS was one of them. Barter Island measured winds up to 50 kn on the 20th and 21st.

On the 22d the USCGC POLAR STAR (40°N, 125°W) had 44-kn winds from the south. The cutter IRONWOOD (56°N, 159°W) had 40-kn winds from the northwest. A SHIP near 53°N, 141°W had 26-ft swell waves. The southerly LOW had now gone ashore over Queen Charlotte Sound, and a new center formed west of Cape Flattery. Winds along the Oregon coast gusted to 60 mi/hr. There were many gale reports in the western semi-circle on the 23d but more significant were the wave reports over 20 ft. Buoy 46003 measured 26 ft and the KUANG HAI (47°N, 151°W) also had 26 ft. Later in the day the centers combined into one 964-mb center (fig. 41). The NOAA research vessel DISCOVERER (55°N, 164°W) measured 60-kn northerly winds. On the 24th buoy 46000 measured 23-ft waves. The storm was falling apart as it went ashore near Craig on the 25th.

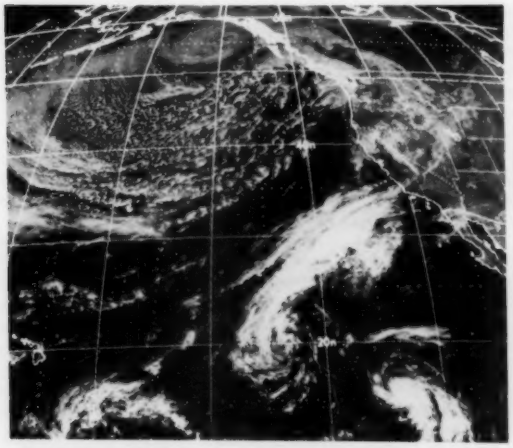


Figure 41.-- The extratropical storm extends south to 30°N. Tropical cyclones Sergio and Tara can be seen south of 20°N.

There were some high swell waves along the coast the last few days of the month from about San Francisco northward. They were not connected with any well developed LOW. Several frontal waves and small LOWs approached the shore during this time. Two cells of the Pacific High were the dominate features. Four fishing vessels sank during this time.

Casualties--The EQUINOX ran aground on Umnak Island on the 15th in a storm. The SARRAT was hit by lightening on the 6th at Coatzacoalcos. The barges SATCO 10 and 21 were locked in ice up to 24 in thick about 35 mi east of Prudhoe Bay and pushed aground during a storm on the 19th.

Enroute to Seattle the HANJIN POHANG lost 22 40-ft containers overboard. The SANTA JUANA also lost containers overboard.

These ships had heavy weather damage: SEA-LAND DEVELOPER, LORETTA, IRON CUMBERLAND, SIBI, and AQUAGEM.

Other Casualties--These vessels encountered heavy weather in the vicinity of Australia: COASTAL TRADER, GAGONE, and LANTAR UTAMA. The barge 183 was capsized during rough weather on the 29th at Ajman Creek, United Arab Emirates.

WEATHER LOG, November 1982--The tracks of extratropical storm centers this month were more evenly distributed over the North Pacific than usual. There were also more storms that formed over the central ocean and farther south. Several storms crossed or approached the California coast, one as far south as Los Angeles. Another traveled southeastward and dissipated off Baja California. A concentration of storm tracks occurred from the vicinity of 45°N, 165°E to the eastern Bering Sea.

The Aleutian Low was the predominate feature on the monthly mean sea-level pressure pattern. It was 996 mb near 54°N, 176°W. Its cyclonic pattern stretched from the Chukchi Sea to latitude 35°N, and the Sea of Japan to Vancouver Islands. The primary center according to climatology is normally over the Gulf of Alaska with two subcenters to the west. The one center this month was near the middle climatic center. The Pacific High at 1020 mb was near normally located over the eastern ocean near 31°N, 148°W. There was an anomalous 1021-mb center near 30°N, 153°E (fig. 42).

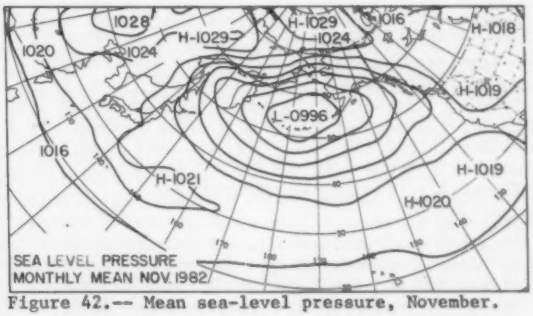


Figure 42.-- Mean sea-level pressure, November.

The anomaly centers were relatively weak. There were 3 of significance, a minus 6 mb near 51°N, 177°W, a minus 4 mb off Cape Blanco, and a plus 4 mb near 26°N, 143°E.

The monthly mean height pattern at 700 mb was primarily zonal between latitudes 30°N and 50°N. There was the usual ridging over the coastal mountains of North America. The primary Low was north of the Sea of Okhotsk with a trough into the central Bering Sea. There was an anomalous High north of the East Siberian Sea. The subtropical High over the western

ocean centered near 24°N, 143°E was 48 m higher than normal.

Typhoon Pamela occurred this month. Hurricane Iwa in the central ocean caused extensive damage to the Hawaiian Islands.

Some climatology. On November 8, 1940 strong winds caused the Galloping Gertie bridge at Tacoma Wa. to collapse just 4 mo after it opened.

Extratropical Cyclones--The first week high pressure dominated from the midlatitudes south. High-pressure cells moved out of Asia on a regular cycle. Low-pressure centers were diverted north of latitude 50°N and were only moderate in intensity.

During the second week the HIGHs weakened and the LOWs moved farther south and increased in intensity. There was a cut-off LOW between Hawaii and California.

The third week was noted for many pressure centers with one severe LOW mixed in.

The HIGHs were again weak during the fourth week with two large severe LOWs plus typhoon Pamela and Hurricane Iwa. A large severe LOW flourished the last days of the month.

This was a very short-lived storm more noted for its high wave reports than high winds. It was first analyzed as a frontal wave on the 0000 chart of the 3d on a north-south front off the Pacific Northwest. There was already cyclonic circulation over the Gulf of Alaska from another deteriorating LOW. At 1200 and 1800 respectively the MOBILE ARCTIC found 33-ft swells and the SANSINENA II had 30-ft swells from the southeast in the vicinity of 55°N, 141°W. Their winds were below gale force. At 0000 on the 4th the storm was 969 mb near 61°N, 147°W. The ATIGUN PASS (59°N, 146°W) had 50-kn winds and 28-ft swell waves. On the 5th the LOW was gone and another had swiftly moved over the Gulf.

On the 5th at 1600 it appeared the KOREAN WONIS SEVEN ran into Tehuantepec winds in the Gulf of Tehuantepec near 14°N, 96°W. She measured 42-kn northerly winds, 33-ft seas, and 39-ft swells. The meteorology situation supported the development of the high northerly winds with high pressure over the U.S. Gulf Coast and northerly winds over the Bay of Campeche. Thanks for the special observation.

This storm came out of Manchuria on the 6th. It moved over the Kuroshio Current on the 8th and started intensifying. By 0000 on the 9th it was 980 mb near 51°N, 168°E. The PACIFIC VENTURE in the southeast quadrant near 46°N, 178°W measured 44-kn southerly winds with 25-ft waves. The POLINA OSIPENKO (46°N, 162°E) in the southwest quadrant had 62-kn winds. The PACIFIC VENTURE had 42 kn at 0600 and 47 kn at 1200 all with 25-ft swell waves. On the 10th a ship near 49°N, 170°W reported 20-ft seas a few mi east of the front. The SEA-LAND ENDURANCE (46°N, 175°E) had 43-kn winds and 26-ft swells. The USCGC JARVIS (53°N, 169°W) had 45 kn. The storm died over the Seward Peninsula on the 12th.

As the storm above moved northward over the Bering Sea, this LOW formed on the 10th in a trough moving through the southwest quadrant of the original storm. At 0000 on the 11th the new LOW was a small storm of 984 mb but the gradient south of the center produced strong winds and high waves. The 8KSB (45°N, 177°W) measured 55-kn winds and the 3FFP nearby measured 26-ft seas on an 0400 special observation. By 1200 on the 11th the storm was 966 mb near 50°N, 179°W. Cold Bay measured 50-kn winds and St. Paul Island 39 kn. The FRIENDSHIP had 40-kn northwesterly winds and the SEA-LAND ENDURANCE (51°N, 164°W) measured only 30 kn southeasterly winds with 20-ft swells that continued into the 12th. This was now a large storm at 952 mb. The PRESIDENT HOOVER (54°N, 176°E) measured 60-kn northwesterly winds and 49-ft waves. Many other ships were reporting strong gales and waves over 20 ft. The wind wave analysis showed 27-ft seas at 1200.

The CANADIAN ACE (54°N, 176°W) found 52-kn northwesterly winds on the 13th with 21-ft swells. The RED ARROW (51°N, 170°W) measured 40-kn winds accompanying 25-ft seas and 26-ft swells from the west-southwest, Buoy 46003 measured 23-ft waves at 1200. By the 14th the storm was dissipating rapidly.

A frontal wave formed on a north-south front in the col area between two large high-pressure cells on the 8th. By the 9th minimal gales were blowing and there were 20-ft swells in the southerly flow. The storm was moving northeastward over the eastern HIGH. The TRIUMPH (48°N, 154°W) found 50-kn northerly winds west of the 990-mb center. The SHINYU MARU about 450 mi southwest of the center had 33-ft swell waves from the northwest. On the 12th the DAIHO MARU (36°N, 140°W), about 150 mi southwest of the 1005-mb center had 48-kn winds and 21-ft seas. The storm was now moving southeastward. The storm was now associated with an upper air cut-off LOW. On the 13th it moved southwestward but turned back southeastward on the 14th. The storm had weakened considerably and by the 15th was only a weak spot in an inverted trough moving toward Baja California.

This LOW developed over Korea on the 15th with frontogenesis in an inverted trough between two high-pressure cells. It developed rapidly as it moved over the Kuril Basin on the 16th. By 0000 on the 17th the storm was 975 mb near 53°N, 161°E. There were many high winds from both ships and the Kuril Islands. OSTROV PARAMUSKI measured 50 kn. The PRIMORLES (51°N, 156°E) measured 54-kn northwesterly winds and 28-ft seas. The ZVEGUIND (47°N, 152°E) reported 35-ft waves. The NARYVNEFT (51°N, 157°E) measured 58-kn northwesterly winds. By 0000 on the 18th the storm was 964 mb near 62°N, 168°E. The SOYOKAZE MARU (53°N, 171°E) had 45-kn westerly winds and 49-ft swell waves. By 0600 they had dropped to 39 ft. The LOW dissipated over eastern Siberia on the 19th.

Early on the 20th the meteorological analysis

Figure 43.-- The Sun sets early at this latitude at this time of the year.

of the ocean east of the date line and north of latitude 30°N indicated several weak LOWs, frontal waves, and troughs. Within 12 hr another LOW developed in one of the troughs and started consolidating the circulation. The VRPP (47°N, 172°E) had southeasterly 56-kn winds. By 0000 on the 21st this was a well-formed storm at 980 mb near 46°N, 176°E. The PRESIDENT TYLER (43°N, 165°E) found 44-kn westerly winds and 25-ft waves. Others had gales. By 0000 on the 22d the central pressure was 960 mb and including a small subcenter covered the ocean north of latitude 35°N from Kamchatka to Vancouver (fig. 43). There were many wind reports above 40 kn and waves over 20 ft. A SHIP near 51°N, 175°W reported 56-kn easterly winds and 43-ft waves with 970 mb pressure reading. The TOYOTA MARU No. 14 west of the center had northwesterly 55-kn winds and 26-ft swells at 1200. The PRESIDENT TYLER was traveling with the storm. Her pressure dropped to 972 mb at 0600 on the 23d. Her winds were up to 50 kn on the 22d. The sea waves were as high as 25 ft on the 22d and 23d. The swell waves were 25 ft on the 21st and increased to 46 ft on the 23d.

On the 23d there were several wind reports near 50 kn in the west and southwest quadrants. The NELSON MARU, 200 mi southwest of the center, had 48-kn westerly winds and 31-ft swells. There were lighter winds in the eastern quadrant but waves of 20 to 25 ft. By the 24th the storm was weakening but there were high swell reports up to 33 ft far south of the center. Hurricane Iwa was passing through the Hawaiian Islands. The LOW was gone by the 25th as another center materialized 600 mi to the northeast.

Cyclogenesis with frontogenesis over the Sea of Japan was the beginning of this storm on the 23d. By 1200 on the 24th winds over 40 kn were already occurring east of Honshu. The DAIHO MARU (36°N, 147°E) had 50-kn winds and 20-ft seas at the cold front. By 0000 on the 25th the 974-mb storm was near 47°N, 151°E. The OCEAN VENUS (39°N, 150°E) had 52-kn winds and 17-ft waves. There were many storm-force winds this day. The PACIFIC VENTURE measured 62-kn and the SINALOA 30-ft waves.

There were even more reports of high winds and waves on the 26th. The storm was now 964 mb. One of the more severe weather reports was from the BENETNASCH (40°N, 161°E) of 60-kn westerly winds and 36-ft seas. The URHJ (40°N, 159°E) measured 52-kn westerly winds with 46-ft seas. The overall cyclonic circulation associated with this storm and including some other low centers covered nearly all of the ocean north of latitude 30°N.

The storm was losing some of its punch on the 27th but there were still winds near 50 kn and waves up to 30 ft. The trend continued into the 28th but the PRESIDENT GRANT (47°N, 155°E) measured 50-kn northwesterly winds at 0900. On the 29th the primary problem was swell waves of 20 ft or more in the 30° to 40°N latitude belt. The PRESIDENT TAFT found 25-ft swells near 35°N, 176°E. The storm crossed south of the coast of Alaska as high pressure built north and eastward. See the last described storm for this month.

This was a small short-lived storm. It popped up out of nowhere late on the 24th as the second previously described storm died. It also was embroiled in the overall cyclonic circulation of the previous storm. At 0000 on the 25th it was 970 mb near 47°N, 147°W. The SINALOA (51°N, 139°W) measured 54-kn winds and 30-ft seas. The WESTWARD VENTURE (56°N, 141°W) measured 48-kn easterly winds and 13-ft seas, and 33-ft swells. On the 26th the EXXON NORTH SLOPE (59°N, 149°W) measured 50-kn easterly winds and 30-ft swells. Buoy 46001 measured 18-ft waves. The storm weakened rapidly and disappeared on the 27th.

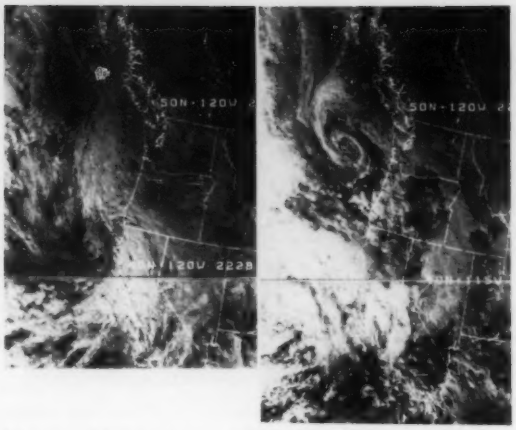
Shanghai exported this storm on the 28th. By 0000 on the 30th it was already a large 986-mb storm over the northern Sea of Japan. A ship found 23-ft seas in the warm sector east of Honshu. Later in the day several ships measured winds over 50 kn and waves up to 30 ft. On December 1 the SEA HAWK (46°N, 152°E) measured 54-kn southwesterly winds and 26-ft waves. There were many wave reports over 20 ft. At 0000 on the 2d the 970-mb storm was at 55°N, 162°E. The ASIA BRAVERY sent in a 1100 observation of 55-kn winds from the southwest driving 33-ft seas with 35-ft swells. On the 3d the HOTAKA MARU (50°N, 172°E) reported 55-kn winds with 23-ft waves at 0000 and 70-kn winds with no waves reported at 0600. Who would want to look overboard? The ATTILA CAPE (52°N, 170°E) reported 39-ft seas and the FARO (52°N, 165°E) had 38-ft swells. At 1200 the HOTAKA MARU was still reporting 70-kn winds. The storm was weakening on the 4th and gone by the 5th.

Torrential rains battered the Pacific Coast of Japan. One ship sank, another capsized, and several dragged anchor and collided with other ships or grounded. The HOUTMANGRACHT collided with the MEITOKU MARU and KIYO MARU. The O'HIGGINS contacted the YUCCA when her mooring ropes broke. The ANDES TRADER and DAIEI MARU collided. The SUMIHISA MARU broke her anchor

chain when it caught on the anchor of the ROYAL RUBY. The DRAGON No. 88 contacted the ISE MARU. The GIN MARU and KAHO MARU grounded. The KASHIMA MARU flooded. The barge SHIGI-2 ran aground.

This storm was a series of small LOWs and frontal waves that formed on the southeastern perimeter of the large storm that had its beginning over the Sea of Japan on the 23d. This particular series of waves became important on the 28th as they moved approximately along latitude 40°N. The SANSINENA II (45°N, 129°W) had light 19-kn winds but the swell was 26-ft from the west. The GOLDEN GATE BRIDGE was sailing west from San Francisco and had winds up to 60 kn on both the 28th and 29th. Her waves were generally about 12 ft. Early on the 29th a LOW moved inland near Cape Blanco (fig. 44). Early on the 30th another LOW moved inland north of Cape Disappointment (fig. 45). A cold front was sweeping down the California coast with high winds behind it. The ANCO CHASER (39°N, 133°W) measured 44-kn northwesterly winds and 25-ft seas. Buoy 46006 measured 20 ft. The following ships had gales and waves as high as 20 ft: SOHIO INTREPID, SEA-LAND DEFENDER, PRINCE WILLIAM SOUND, and CHEVRON HAWAII. The HELLSPONT COURAGE (43°N, 130°W) measured 55-kn winds.

On the 30th Los Angeles International Airport measured 60 mi/hr winds. San Francisco reported gusts greater than 55 mi/hr. Up to 5 in of rain fell in the southern California mountains, and up to 4-ft of snow in the higher mountain passes. Mud, rocks, and fallen trees blocked



Figures 44 and 45.-- These satellite images show the storms as they approach the coast late on the 28th (left) and 29th (right).

roads and damaged buildings. The barge FOSS 286-1 broke loose from its tug. Nine people died as a result of the storm. Beaches were badly eroded and property damaged. See figures 46 and 47. Winds off the coast continued up to 45 kn on December 1 with waves up to 25 ft. The storm moved over the Great Basin and high pressure moved in on the 2d but winds continued to gust to 45 kn along the coast.

Casualties--The purse seiner RADIANT and TUGILLAN sank off Whidbey Island in heavy swells on the 3d.

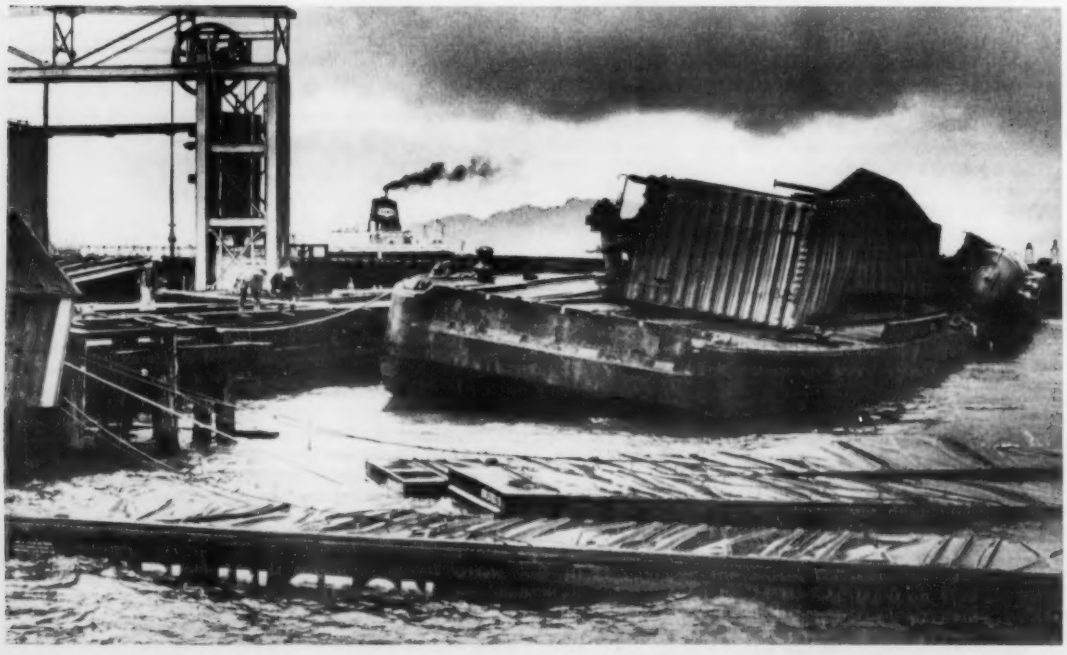


Figure 46.--These three boxcars and the tankcar were blown from the barge in the background at the Point Richmond pier on the 28th. Wide World Photo.

Figure 47.-- A wet scenic view at Fort Point as the winds gusted to more than 55 mi/hr through the Golden Gate. Wide World Photo.

The NEPTUNE SKY was abandoned on the 10th when she listed 15 degrees in rough seas with a cargo of logs. The UNION WISDOM and BAH KIM both had weather damage on the 12th. The PRINCESS MIRI and SHANGFENG had weather damage about the 26th. The PRESIDENT MCKINLEY, NALO EXPRESS, and FENTRESS had weather damages.

Other Casualties--The ORTELIUS had damage on a voyage from Durban to Port Elizabeth. The EASTERN GUARDIAN dragged anchor off Sharjah on the 30th in heavy seas and gale winds and struck the ALEXION HOPE.

WEATHER LOG, DECEMBER 1982--The tracks of the centers of the principal storms did not follow the climatological tracks this month. The majority of the tracks were basically straight lines east-northeastward from the Asian coast to about 160°W longitude. A few curved northeastward out of Asia over the Sea of Okhotsk. East of longitude 160°W some storms continued northeastward while others curved northward. There were three principal tracks; one from 600 mi east of Tokyo to about 40°N, 160°W, and the other from the Tsugaru Strait to 53°N, 175°E. Another could be considered from about 43°N, 150°W into Queen Charlotte Sound.

The normal sea-level pressure chart indicates two centers (1001 mb and 1002 mb) for the Aleutian Low. This month there was one 990 mb center near the Shumagin Islands. The Pacific High was a normal 1021 mb near 30°N, 132°W. There were two anomalous high-pressure centers; one 1024 mb near 27°N, 172°E and another 1027 mb near 80°N, 170°W. The Asian High was 1044 mb, 9 mb higher than normal (fig. 48).

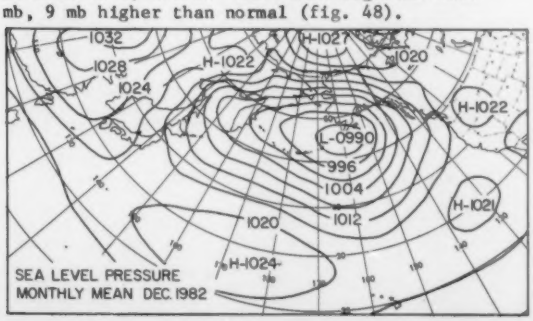


Figure 48.-- Mean sea-level pressure, December.

These departures from normal resulted in large anomaly centers, most positive. The Aleutian center was minus 14 mb near the Low center. There was a plus 8 mb center near 30°N, 173°E and another plus 8 mb center near 81°N, 160°W.

The upper-air pattern at 700 mb was zonal from Japan to about longitude 160°W where there was a sharp long-wave trough and the flow turned more northward than normal. The principal Low center was north of the Sea of Okhotsk with an east-southeasterly trough across Unimak Island. The normal ridge over the Rocky Mountains extended into an anomalous High center near 80°N, 170°W.

Typhoon Roger occurred this month.

Some Climatology. On December 11, 1932 very cold weather prevailed along the West Coast. San Francisco received nearly an in of snow and the temperature dropped to 20°F at the airport.

Extratropical Cyclones--An overview of the weather the first week indicated the typical situation of a large LOW near Kamchatka, several small LOWs, and high pressure along latitude 35°N. At the end of the week the shipping lanes were dominated by a large LOW which continued into the second week. The HIGHs were weak with weak LOWs over the eastern ocean. The large LOW gradually shifted to the Gulf of Alaska by the end of the week.

During the third week the LOW gradually broke down with a HIGH over the central ocean near 40°N. Another severe LOW built over the Gulf of Alaska by the end of the week. The LOW broke into multiple centers the fourth week with a strong Pacific High. Another large storm moved across the northern ocean and broke up by the end of the month.

The first major storm started in November and is described in that month.

This storm came out of Siberia from the vicinity of Lake Baykal. It crossed into the Sea of Okhotsk on the 4th. On the 5th the MYS TCHASSOVOI northwest of the 968 mb storm center measured 50-kn winds and 33-ft seas. There were gales along the Northern Kuriles and Kamchatka. The JOHN SCHEHR had carge shift off Kyushu and returned to Kobe. The storm was moving slowly northeastward and on the 6th the GOLDEN GATE BRIDGE (35°N, 146°E) was associated with a frontal wave and 68-kn northerly winds. A ship near 51°N, 166°E just east of the occluded front had 45 kn-winds and 23-ft waves. At 1200 on the 7th the storm was 944 mb near 59°N, 160°E. The storm covered the area north of 40°N and west of 165°W. There were three reports of winds over 60 kn received. They were from the JUNEAU MARU (54°N, 177°E), TOYOTA No. 24 (54°N, 178°W) and KAMCHATSKAYA PRAVADA (54°N, 160°E). Other ships had waves near 30 ft including the FORT NANAIMO (50°N, 165°E).

There were some small short-lived LOWs to the east and southeast with gales and buoy 46001 measured 30-ft seas.

The storm was filling on the 8th with gales and some swell waves over 20 ft. The PACBARON (48°N, 176°W) measured 32-kn winds but reported 33-ft seas, and 37-ft swells. The ALSTER

EXPRESS and FORT NANAIMO in the vicinity of 48°N, 162°E reported swell waves of 25 and 29 ft. Barter Island on the Arctic Ocean measured winds of 43 mi/hr. On the 9th Cold Bay measured 49 mi/hr southeasterly winds. The storm broke into multiple centers on the 10th and was soon gone.

It appears the EXXON NORTH SLOPE (15°N, 96°W) ran into Tehuantepecer winds of 51-kn and 17-ft sea on the 9th.

On the 6th there was an elongated north-south LOW near 155°W between two large HIGHs. A LOW center popped out north of the original center and yet another LOW materialized southwest of the old center on the 7th. The tightening of the gradient between this last LOW and the western HIGH brought gales. The PACIFIC PEACE far to the south (23°N, 174°W) had 34-ft swell waves from the north. The LOW moved eastward then northward along 150°W on the 8th. The GLOBAL PACIFIC (31°N, 159°W) had 23-ft swells.

By 0000 on the 10th the 980 mb storm was near 46°N, 149°W. A 986-mb LOW had formed in a trough about 500 mi to the west and a frontal wave was racing eastward about 400 mi to the south. There were several gale reports south and east of the centers. The PACIFIC VENTURE had 23-ft swells northeast of the primary center. At 1200 the storm was 968 mb. On the 11th the highest winds were 52-kn by the CELTIC SEA about 50 mi due south of the 960-mb center. Several ships had waves over 20 ft and the 3EEV (35°N, 160°W) had 30 ft. On the 12th there was a band of high winds and waves between latitudes 45° and 48°N and longitude 145° to 170°W. The PACMERCHANT had 50-kn winds and 20-ft waves. The SURUGA MARU had 33-ft swells. The fishing vessel AMERICAN BEAUTY dragged anchor and grounded at Atka Island.

The 966-mb storm was near Kodiak on the 13th and another frontal wave was racing through the southwest quadrant (fig. 49). The EXXON NEW ORLEANS found 33-ft swells near 53°N, 138°W. The GLACIER BAY (40°N, 154°W) had 50-kn winds and 20-ft waves. Some ships south of the frontal wave had 20- to 25-ft waves. By the 14th this LOW was gone and the frontal wave was the storm.

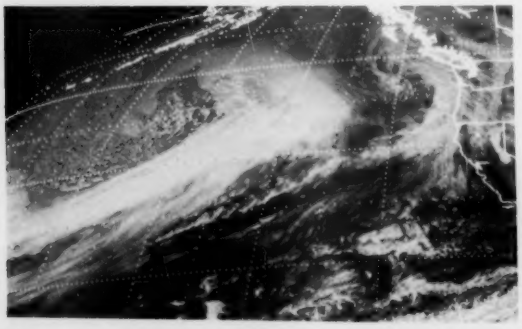


Figure 49.-- The parent LOW is not visible on this image due to curvature of the Earth and the Sun angle. The frontal wave can be seen south of Kodiak.

Another Monster of the Month--There was a weak pressure area over the Yellow Sea on the 10th and a 1012 LOW center was found on the 1200 analysis. By 0000 on the 12th the 986-mb storm was near 47°N, 160°E. The MING GLORY sent a 2300 observation of 50 kn and 23-ft waves. On the 13th several ships had winds over 50 kn including the BARBER THERMOPYLAE (39°N, 165°W) with 54 kn and 30-ft waves. Others were reporting waves over 20 ft. At 0000 on the 14th the storm was 948 mb at 50°N, 157°W. There was an area of high winds east of the center and occluded front and another 500 to 800 mi southwest of the center. The SAMRAT ASHOK (44°N, 172°W) had 50-kn winds, 28-ft seas and 46-ft swells. Other higher winds were 40- to 50-kn and waves up to 30 ft.

The 15th had a frontal wave moving through the southern semicircle. There was an area of high winds and waves about 300 mi south of the center of the 940 mb storm. Another larger area encompassing the frontal wave was about 1,000 mi from the center from the southwest quadrant into the southeast quadrant. The ZIM IBERIA and HARUNA MARU both measured 60-kn winds and 33- to 25-ft waves west of the frontal wave. The PACLADY (48°N, 142°W) measured 50-kn winds with 49-ft swells. The USCGC RESOLUTE near the Columbia River had only 41-kn winds but the swell was 30 ft. Buoy 46004 measured 33 ft waves. The ASIA ANVIL had to return to Port Alberni after the cargo shifted.

On the 16th the frontal wave was approaching the Oregon coast and another LOW had formed to the west (fig. 50). There were still winds of 60 kn and waves of 30 ft closer to the coast now than the previous day. The EXXON NEW ORLEANS (42°N, 127°W) measured 72-kn winds with 20-ft seas, and 42-ft swells. Only a few miles away the KENAI measured 60-kn winds and 35-ft seas. High winds ravaged the Washington-Oregon coasts. Astoria measured gusts to 80 mi/hr on the 15th and reached 60 mi/hr along the Washington coast. Crescent City, Calif. had 4 in of rain in 24 hr. Areas in Oregon had over 2 in.

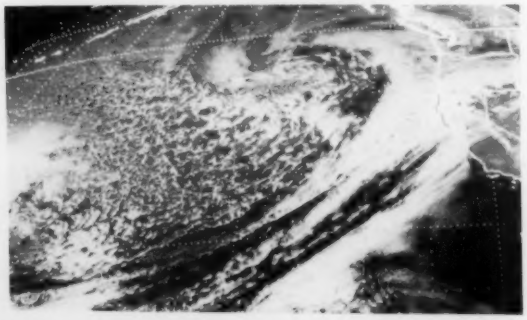


Figure 50.-- The storm is centered off Portland, Oregon.

The Indian motor vessel JALAMORARI began taking on water in 50-kn winds and 30-ft seas on the 16th, 700 mi off the Oregon coast, and sank. All 61 persons aboard abandoned ship in lifeboats. The TIMUR GIRL rescued all 61 but one died. The tow-wire from the tug WILLIAMETTE PILOT III to the barge HAAKON parted in the

storm on the 16th. An emergency connection also parted early on the 18th.

The storm system was weakening on the 17th as the LOW circled over Kodiak Island. There were still some high winds and waves but the frequency was decreasing. On the 18th another frontal wave raced through the weakened southern circulation and the storm disappeared.

This potential star was waiting off stage (Sea of Japan) on the 16th for the star of the show to exit stage right (previous storm). The center crossed Hokkaido on the 17th and the LPG tanker BOWOON ran aground near Naha, Okinawa. The storm was producing some gales and 20-ft waves on the 18th. By 0000 on the 19th it had combined with another LOW from the Sea of Okhotsk at 960 mb near 54°N, 179°W. St. Paul Island measured 46 mi/hr winds. Two Japanese ships near 47°N, 172°E measured 55-kn winds, one had 43-ft waves and the other 30-ft swell. The SEA-LAND PATRIOT (53°N, 180°) measured 50 kn and 35-ft waves. Several ships had winds of 50 kn or greater in the southwest quadrant on the 20th, including the SKAUGRAN (54°N, 172°W) which measured 67-kn winds. By the 21st the storm had rotated counterclockwise with the major trough paralleling the North American coast. The higher winds and waves were north of latitude 50°N. The storm split into multiple centers and was rapidly weakening.

Figure 51.-- This severe storm is storming ashore near Cape Mendocino.

Another frontal wave moving through the southern perimeter of the storm intensified as it neared the California coast on the 22d (fig. 51). Winds were reported to have gusted up to 90 mi/hr along the coast. The Golden Gate Bridge was swaying 5 ft and was closed for the second time in history. Six electric pylons were blown down outside San Francisco causing a chain-reaction power grid failure involving three states. The entire state of Arizona was briefly without power, as was Las Vegas, Nev. There were large power failures all along the California coast. Up to 8 in of rain fell in the mountains.

On the 20th two ships reported high winds and waves in the Gulf of Tehuantepec. The ATIGUN PASS had 32-kn northerly winds and 25-ft waves at 1200. The KEYSTONE CANYON measured 40-kn northeasterlies and 33-ft waves at 1800.

The East China Sea produced this storm. A homogeneous LOW moved eastward from Mongolia. Frontogenesis occurred as the eastern circulation picked up moisture and a frontal wave formed in the inverted trough far to the south on the 21st. There was a complex three centered LOW from east of Honshu to Manchuria on the 23d. There were gales in the southerly flow and a ship near 41°N, 156°E reported 50-kn winds. At 0000 on the 24th the 970-mb LOW was near 45°N, 165°E. The KOKKO MARU (36°N, 172°E) near the front measured 45-kn southwesterly winds with 33-ft swells.

On Christmas day several ships had winds near 50 kn and waves near 30 ft in the southwest quadrant. It was now a large storm moving toward the eastern Bering Sea and dominating most of the northern ocean. The winds were mostly gales with a few wave reports over 20 ft. On the 27th a frontal wave broke away the southern part of the storm and became the dominate system.

Casualties--The following ships suffered heavy weather damage: ATACAMA, BAH KIM, BUNGA KESUMBA, BUNGA MELATI, CHENNAI OOKKAM, EASTERN SAGA, FLORECIMIENTO, GARIFALIA C., HYUNDAI CON SIX, IRAN SHEYAMAT, JAPAN CANELA, KAPTAI, MAIN EXPRESS, MANILA, MORNING GLORY, OSAM FALCON, PRESIDENT TAFT, PUEBLA, SEA BELLS, AND STAR CARRIER.

The MILLION No. 1 with a cargo of cement sank in rough weather at Kuola Rejang. The SIN LIAN rescued all 19 crew members.

Hurricane Alley

Dick DeAngelis
National Environmental Satellite, Data, and Information Service
Washington, D.C.

The tropical cyclones tracks (fig. 52) and summaries that follow are based on information provided by the National, Eastern Pacific and Central Pacific Hurricane Centers, the Naval Environmental Prediction Research Facility and the Joint Typhoon Warning Center. Summaries were also provided by Fiji Meteorological Service, and the Meteorological Department of Reunion.

Included in this issue is the track of tropical storm Ernesto in the North Atlantic (fig. 53). Post analysis indicated that the storm developed on the last day of September.

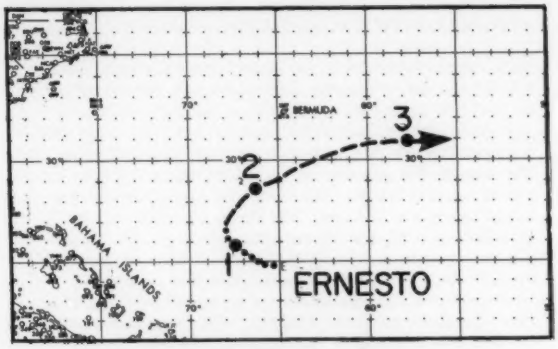


Figure 53.--Tropical storm Ernesto.

TROPICAL CYCLONES--OCTOBER 1982

During a normal October about nine tropical cyclones develop of which five become hurricanes. Activity this year was close to normal (table 6). The most unusual feature was the formation of tropical storm Joti on the last day of the month in the South Pacific. Not since hurricane Bebe in 1972 has a cyclone developed this early. Joti came to life in the area northeast

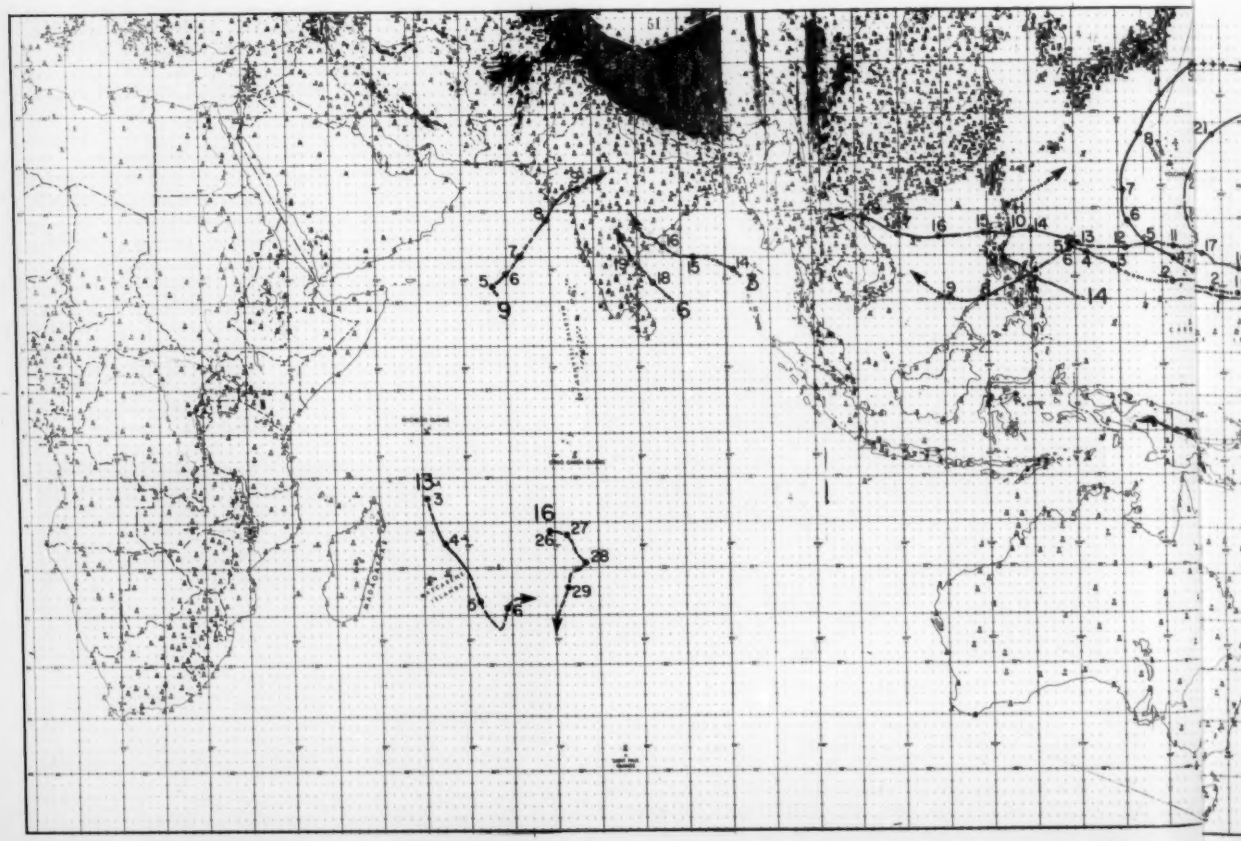
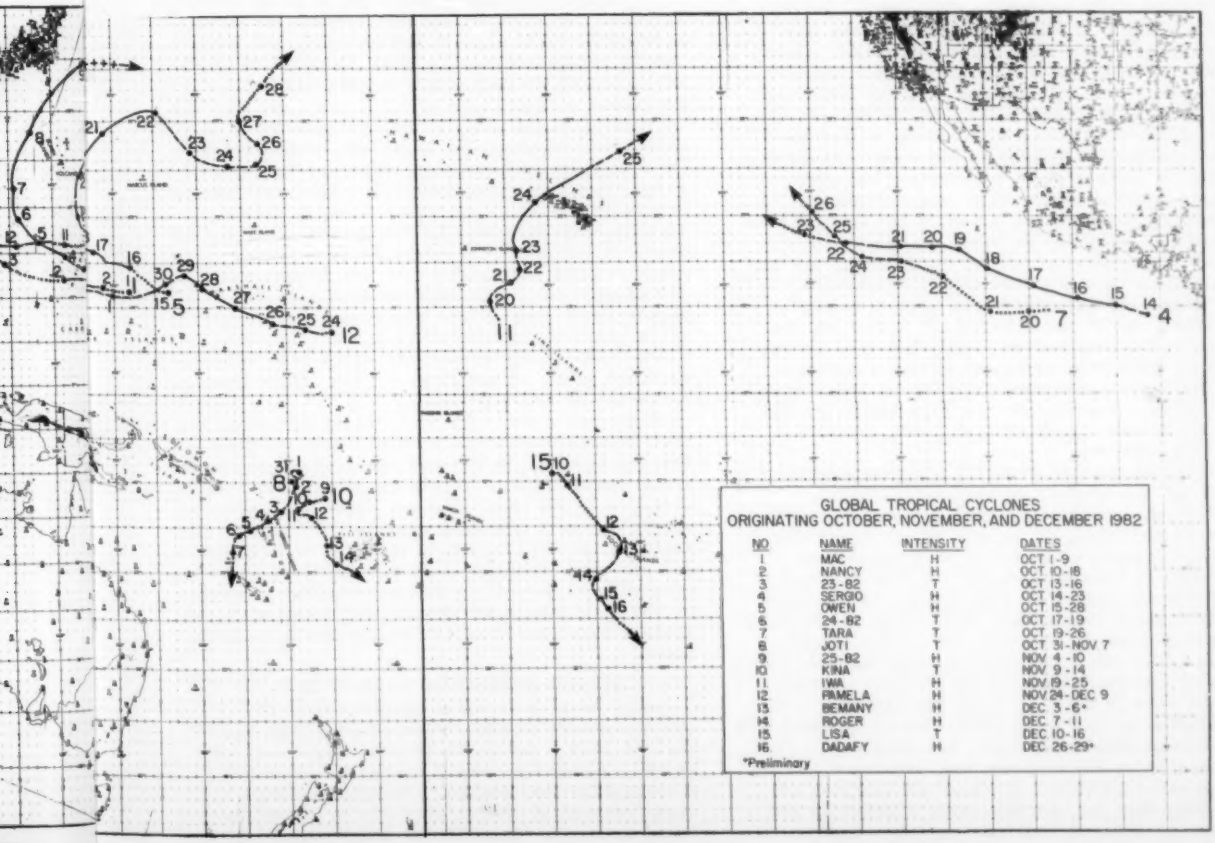


Figure 52.--Global tropical cyclone tracks October, November, December 1982.

Table 6.--Global tropical cyclone summary October, November, and December 1982.

No.	Name	Est. max. wind (kn)	Basin	Dates
		October 1982		
1	Mac	140	W. North Pacific	1-9
2	Nancy	115	W. North Pacific	10-18
3	23-82	50	North Indian	13-16
4	Sergio	110	E. North Pacific	14-23
5	Owen	105	W. North Pacific	15-28
6	24-82	50	North Indian	17-19
7	Tara	45	E. North Pacific	19-26
8	Joti	60	South Pacific	31-Nov. 7
		November 1982		
1	25-82	90	North Indian	4-10
2	Kina	40	South Pacific	9-14
3	Iwa	80	C. North Pacific	19-25
4	Pamela	100	W. North Pacific	24-Dec. 9
		December 1982		
1	Bemany	65	South Indian	3-6
2	Roger	65	W. North Pacific	8-
3	Lisa	60	South Pacific	10-16
4	Dadafy	65	South Indian	26-29

of the Santa Cruz group. Moving south-southwestward the system intensified so that by late on November 2d the maximum sustained winds were estimated at 50 kn. The only synoptic station near its path was Luganville on the southeast corner of Espiritu Santo, which reported winds of 30 to 33 kn on the 3d and 4th. It is likely that stronger winds were experienced over the northern portion of the island as the cyclone crossed it. Maximum winds were estimated at 60 kn between 1200 on the 3d and 1200 on the 4th. Mac, the first tropical cyclone of the month left little doubt as to his intensity. This supertyphoon generated hurricane force winds from the 3d through the 9th. His maximum winds climbed to 130 kn late on the 4th and reached a peak of 140 kn with an 895-mb pressure on the 5th. Mac recurved before striking Japan and the XI JIANG sank off southeastern Kyushu on the 7th in heavy weather. Thirteen crewmen were rescued but three were missing. Typhoon Nancy followed on the heels of Mac but took a westerly track, bringing strong winds, high tides, and torrential rains to the northern Philippines and Vietnam. Maximum winds reached 115 kn around a 926-mb pressure center on the 14th shortly before


GLOBAL TROPICAL CYCLONES
ORIGINATING OCTOBER, NOVEMBER, AND DECEMBER 1982
NO NAME INTENSITY DATES
1 MAC H OCT 1-9
2 NANCY H OCT 10-18
3 23-82 T OCT 13-16
4 SERGIO H OCT 14-23
5 OWEN H OCT 15-28
6 24-82 T OCT 17-19
7 TARA T OCT 19-26
8 JOTI T OCT 31-NOV 7
9 25-82 H NOV 4-10
10 KINA T NOV 9-14
11 IWA H NOV 19-25
12 PAMELA H NOV 24-DEC 9
13 BEMANY H DEC 3-6*
14 ROGER H DEC 7-11
15 LISA T DEC 10-16
16 DADAFY H DEC 26-29*
*Preliminary

82.

running aground on Luzon. On the island about 68 people were listed as dead with 22 missing. Some 50,000 people were left homeless. The rice fields and tobacco and cotton plantations suffered heavy damage. In Vietnam there were 32 deaths with 200,000 left homeless. Storm tides sank an estimated 12 ships. During the period that Nancy was roaming the South China Sea there was a flurry of activity elsewhere. Two tropical storms had developed in the Bay of Bengal and moved ashore along the east coast of India. In Andhra Pradesh State 10 people were killed and 50,000 were left homeless. Hurricane Sergio had embarked on a long westward journey through the eastern North Pacific while typhoon Owen in the western North Pacific made his way through the Mariana Islands before recurving. Owen's maximum windsclimbed to 105 kn around a 939-mb center on the 20th while Sergio sported 110-kn winds late on the 17th and early on the 18th.

TROPICAL CYCLONES--NOVEMBER 1982

The 4 tropical cyclones, 3 of which were hurricanes, that formed during this month were below the average of 6 to 7. In the Arabian Sea a hurricane moved across the Saurashtra Peninsula on the 8th. Maximum winds were estimated at 90 kn before landfall. The PETROMARE LIGHT dragged anchor and her bow hit the port side of the ST. NICOLAS on the 8th. The coastal area near Veraval suffered. Some 4,050 villages and 4.5 million people were affected. The Gujarat Home Minister said that 200 workers were trapped in salt mines and the Indian Air Force sent helicopters to rescue them. Also 42 fishing vessels sank. There was havoc in Gujarat's peanut growing Saurashtra region where wind and rain caught freshly harvested peanut crops lying in the open fields. Meanwhile below the equator, in the South Pacific, tropical storm Kina was making his way between the New Hebrides and Fiji Islands. It was a minimal tropical storm with peak winds estimated at 35 to 40 kn on the 11th. As the degenerating depression approached Fiji on the 13th it generated strong winds and rough seas in the Yasawas and Mamanutha Groups and western Viti Levu. Tourists on the Blue Lagoon cruise in the Yasawas reported that their vessel had to take shelter.

Tropical cyclone activity was next spotted north of the equator in the central North Pacific where hurricane Iwa (ee-vah) came to life on the 19th. This late season tropical cyclone devastated portions of the Hawaiian Islands. A detailed account of this storm can be found on page 63 of this issue. A few days later typhoon Pamela developed among the Marshall Islands, which is uncommon for a late season storm (fig. 54). Pamela went on to become the longest running western North Pacific cyclone of the year in terms of time and distance. She dissipated in the South China Sea on December 9. Pamela developed slowly and this was attributed to the proximity of hurricane Iwa in the central Pacific. She reached her peak on the 28th when her maximum winds climbed to 100 kn around a 940-mb pressure center. By the following day she had dropped back to tropical storm strength. Pamela weakened to a depression on December 2. However, she slowed and by the 7th had reached typoon strength once again as she moved through the central Philippines.

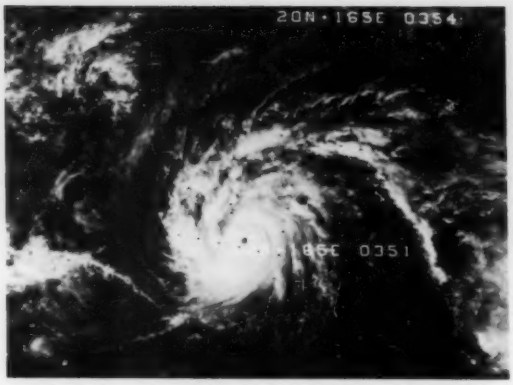


Figure 54.-- Pamela's photo was snapedd on the 27th among the Marshall Islands.

TROPICAL CYCLONES--DECEMBER 1982

On the average, this month produces six tropical cyclones, two of which reach hurricane strength. While only four developed this year Bemany and Dadafy in the South Indian Ocean and Roger in the western North Pacific all reached hurricane strength.

While Lisa was only a tropical storm her development east of 160°W marked the beginning of a very active season in these waters (see first item in Hurricane Alley). Lisa had her origin in a shallow depression, which formed west of Penrhya Island in the Northern Cooks Group on the 10th. Two days later maximum winds reached gale force with the center about 150 mi west-northwest of Bora Bora. As it moved closer, the island reported easterly and later northerly gales. During the 13th the TIARE MOANA encountered 45-kn winds both at 1200 and 1800. Winds close to the center were estimated at about 60 kn.

Roger was a short-lived tropical cyclones that developed over the southern part of the Philippine Sea. He skimmed the eastern Philippines and managed to intensify to typhoon strength on the 9th. However upper level conditions were changing rapidly and Roger weakened to tropical storm strength before the day was out. Maximum winds were minimal typhoon strength--65 kn--with a minimum central pressure of 985 mb. Bemany and Dadafy both reached minimal hurricane strength in the South Indian Ocean.

UNUSUAL ACTIVITY IN SOUTH PACIFIC

South Pacific tropical cyclones east of 160°W are rare events. From 1969 through the fall of 1982 a total of six had formed east of 160°W. During the past 5 months six more had developed in this region. Tropical cyclone Veena devastated Tahiti with 95- to 110-mi/hr winds in April. Some 15,000 people were left

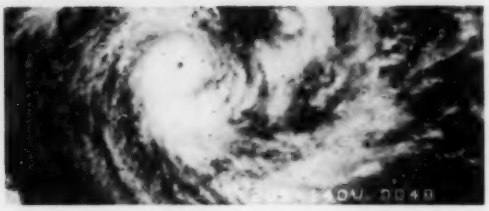


Figure 55.-- William becomes the first in a succession of eastern South Pacific storms on the 27th.

homeless. Another April tropical cyclone, William, formed farther east (133°W) than any other storm on record (fig. 55). This unusual activity has occurred in a year that has featured a strong El Nino, which has pushed warmer-than-normal equatorial water westward to near the International Dateline in the months preceding this flurry.

According to Hans Rosendahl, director of the Central Pacific Hurricane Center in Hawaii, April sea-surface temperatures in the region remain a few degrees above normal. Rosendahl and Earl Hinz, a boating magazine reporter, have found that from 1825 through 1982 only about 20 cyclones have affected the Tuamoto Archipelago. So far this season five more cyclones have moved through the islands. Table 7 shows activity in the eastern South Pacific during the past 14 seasons, which seems to indicate a correlation between warm episodes and increased tropical cyclone activity. Table 8 lists the initial positions of tropical cyclones that have formed near or east of 160°W since 1939. Activity in the 1982-83 season accounts for nearly 30 percent of these events.

Table 7.--Eastern South Pacific Tropical Cyclone Activity+

	No. of cyclones east of 160°W	No. of Cyclones formed east of 160°W
1969-70*	3	0
1970-71	1	0
1971-72	3	0
1972-73*	2	0
1973-74	2	0
1974-75	0	0
1975-76	1	1
1976-77*	6	1
1977-78	4	2
1978-79	2	0
1979-80	3	0
1980-81	2	2
1981-82	3	0
1982-83*	8	6

+Tropical cyclone season runs from about October through May.
*Warm episodes or strong El Nino years.

Table 8.--Initial Location of Eastern South Pacific Tropical Cyclones (near or east of 160°W) 1939-83

Date	Approximate Initial Position
December 1940	8°S, 159°W
January 1941	8°S, 160°W
February 1942	11°S, 157°W
January 1946	15°S, 154°W
January 1955	15°S, 151°W
January 1958	14°S, 158°W
January 1959	16°S, 153°W
March 1961	12°S, 160°W
February 1970	15°S, 161°W
January 1973	14°S, 161°W
February 1976	22°S, 145°W
April 1977	11°S, 156°W
December 1977	11°S, 157°W
February 1978	14°S, 159°W
February 1981	15°S, 162°W
March 1981	18°S, 156°W
March 1981	22°S, 148°W
December 1982	9°S, 160°W
January 1983	17°S, 141°W
February 1983	11°S, 162°W
February 1983	14°S, 143°W
March 1983	12°S, 147°W
April 1983	13°S, 140°W
April 1983	12°S, 133°W

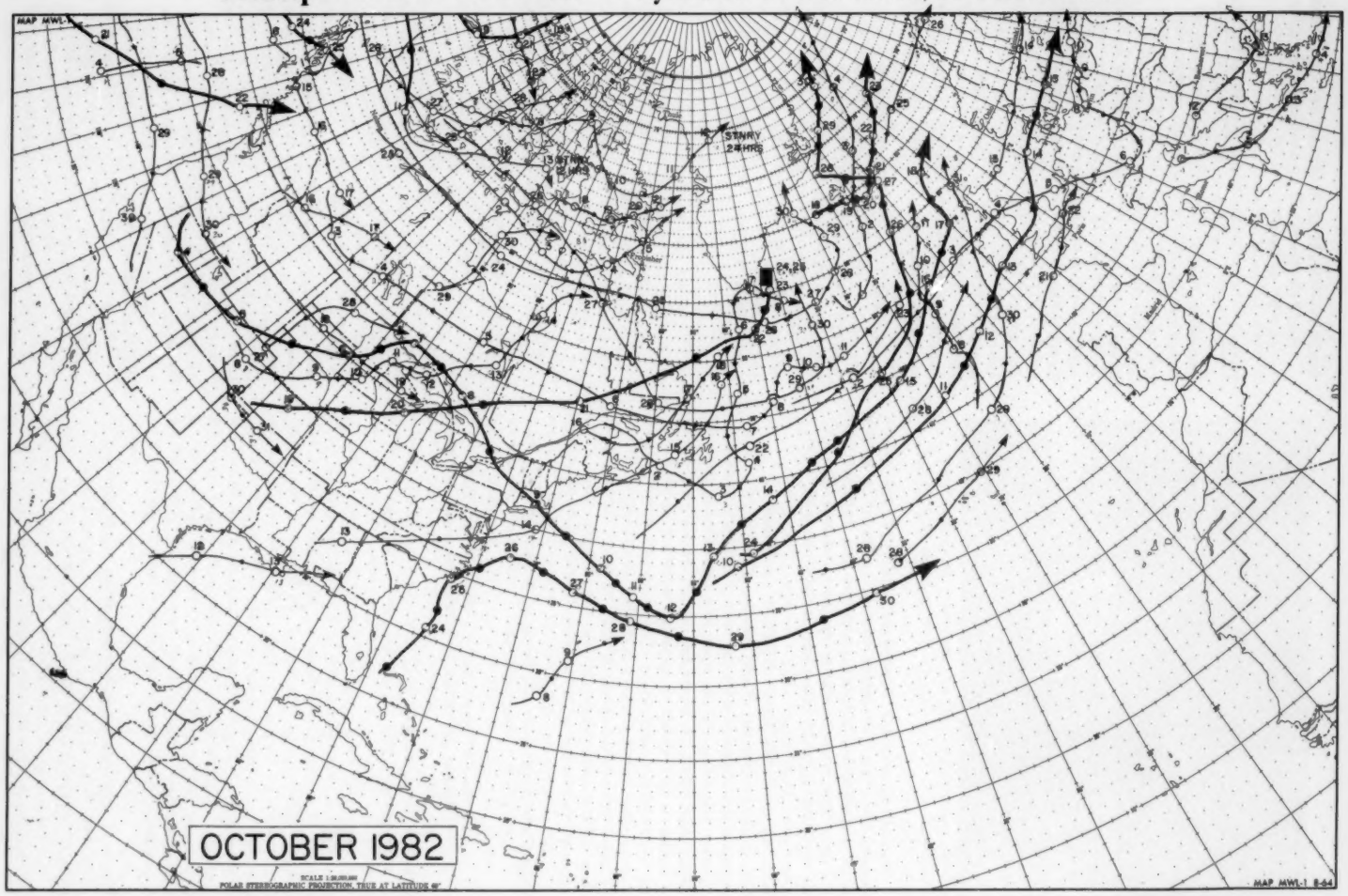
TROPICAL CYCLONE WATCH--1983

Table 9 is a preliminary list of the global tropical cyclones that have occurred up till press time.

Table 9.--Tropical Cyclone Watch, 1983

Australia-South Pacific			
Jane	07S-83	H	Jan.
Des	09S-83	T	Jan.
Mark	10S-83	H	Jan.
Namo	11S-83	T	Jan.
Elinor	13S-83	H	Feb.
Nisha	14S-83	H	Feb.
Oscar	15S-83	H	Feb.
Prema	16S-83	T	Feb.
Ken	17S-83	T	Feb.
Rewa	18S-83	H	Mar.
Sarah	19S-83	H	Mar.
Tomasi	20S-83	H	Mar.
Lena	21S-83	T	April
Veena	22S-83	H	April
William	23S-83	H	April
Monty	25S-83	T	April
South Indian Ocean			
Elinah	8S-83	T	Jan.
--	12S-83	T	Feb.
Naomi	24S-83	T	April

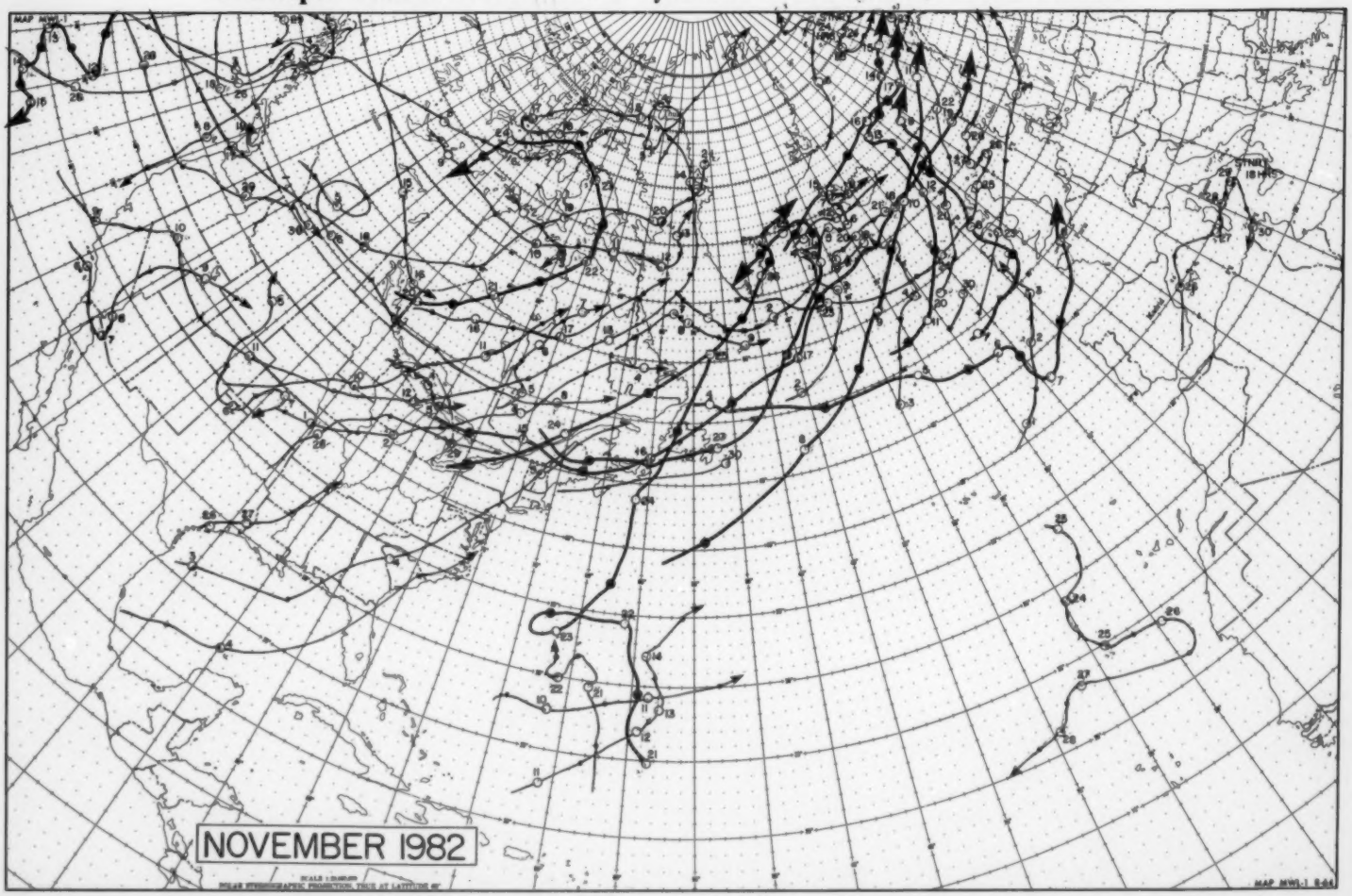
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



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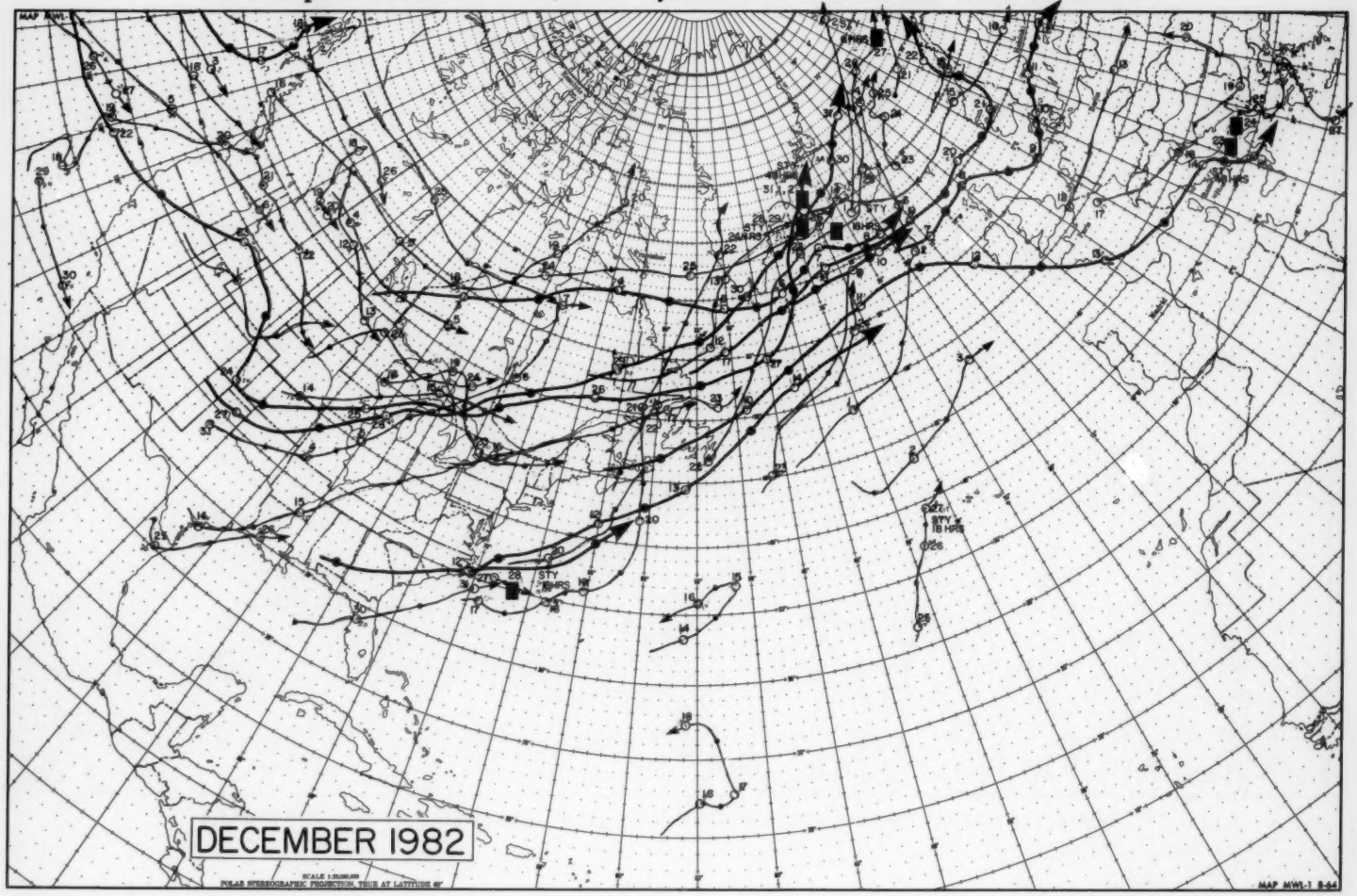
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



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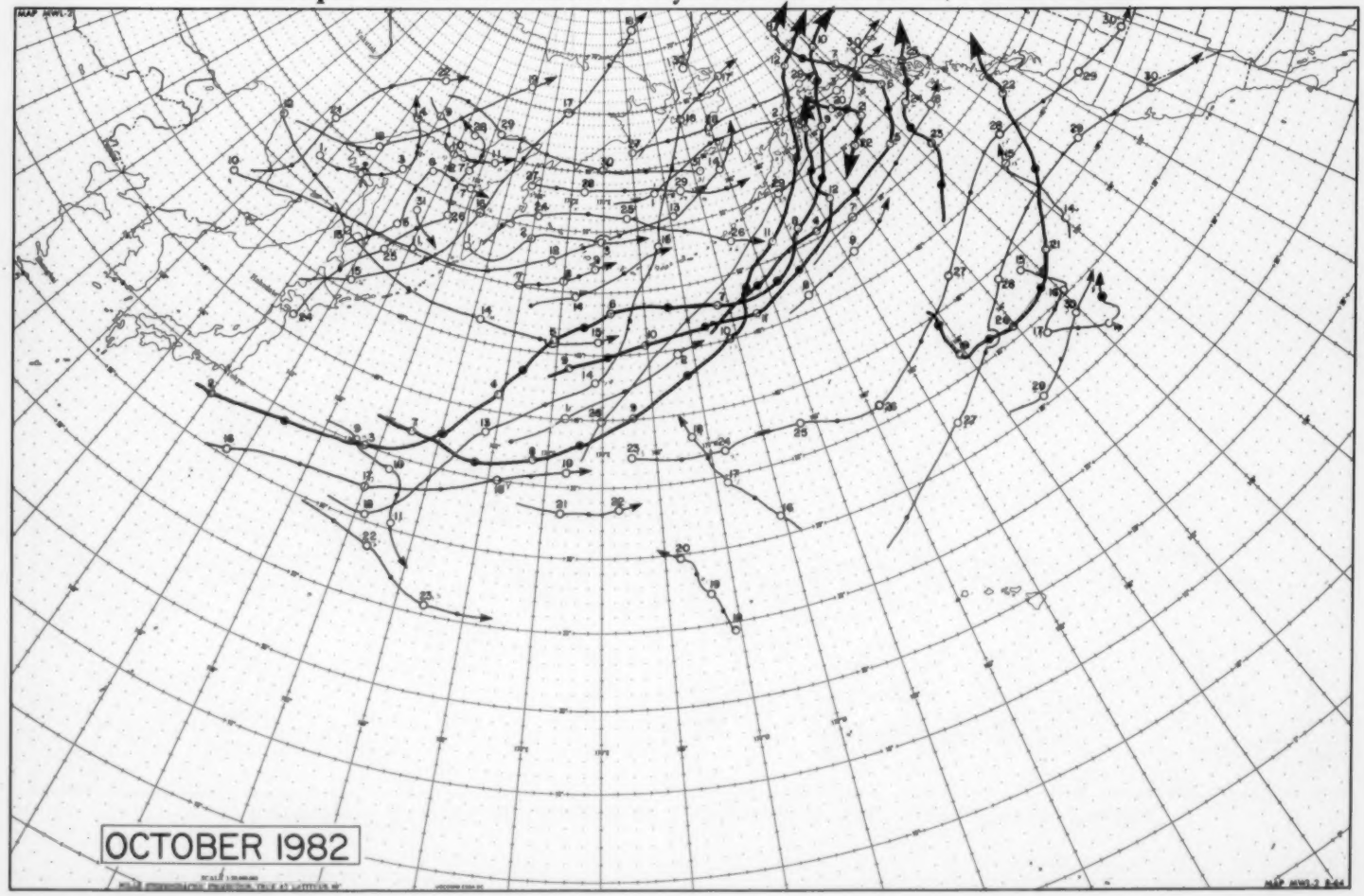
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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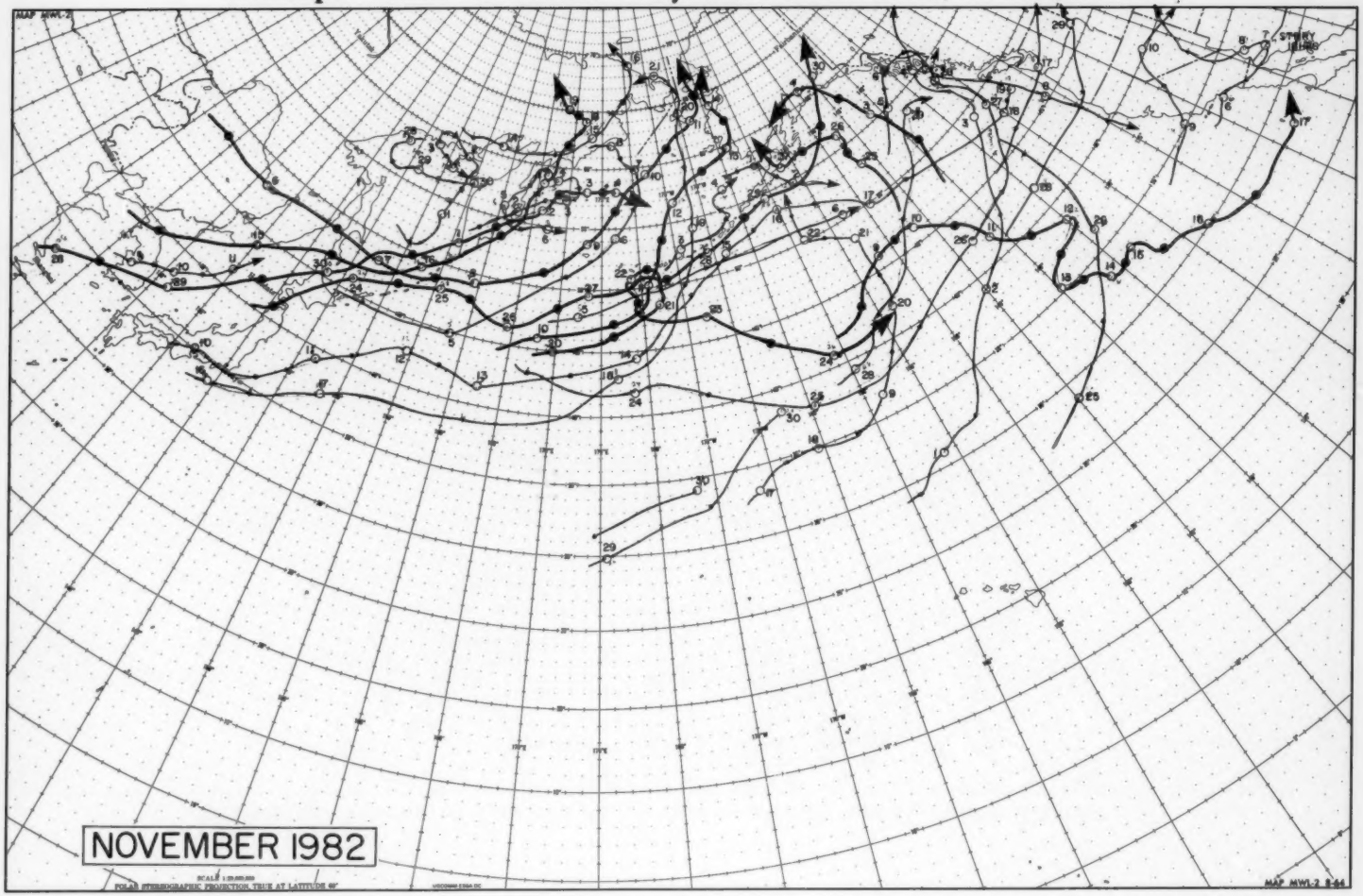
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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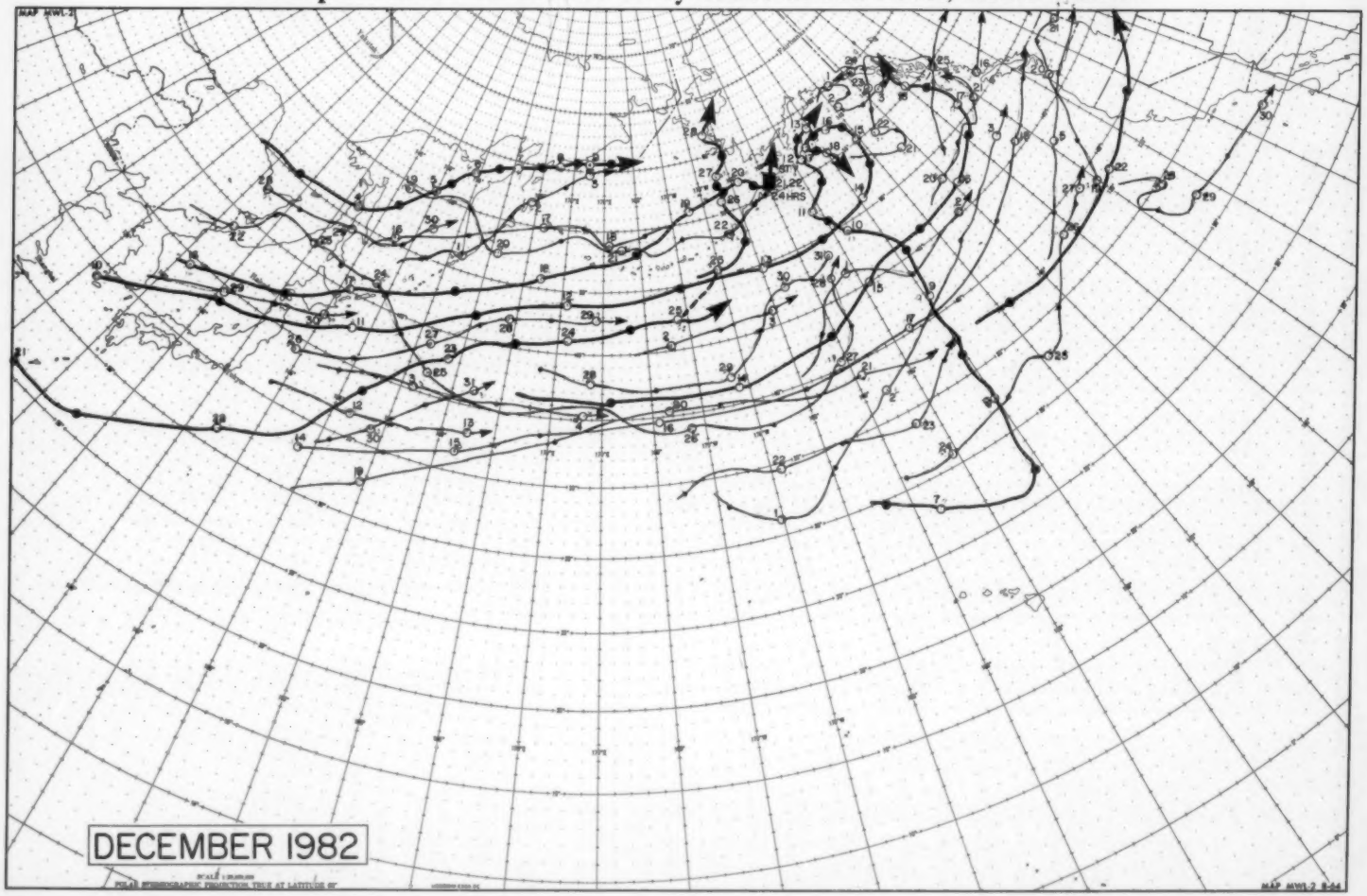
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

North Atlantic Selected Gale and Wave Observations

October, November and December 1982

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves? Period sec.	Sea Waves? Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
	ATLANTIC	OCT.															
SEALAND PRODUCER	WJBJ	1	47.2 N	09.2 W	00	22	52	5 NM	03	1009.9	17.2	14.4	XX	19.5	22	XX	19.5
AMERICAN ARGOSY	KFCX	1	44.6 N	26.2 W	12	27	35	10 NM	02	1008.0	16.7	16.7	6	16.5	26	9	32.5
AMERICAN ARGOSY	KFCX	2	43.5 N	30.4 W	00	27	30	10 NM	02	1015.3	14.4	18.9	6	16.5	28	9	24.5
SANTA JUANA	KFFJ	2	15.3 N	96.0 W	18	04	50	2 NM	62	1010.8	25.7	24.4	XX	8	06	11	10
MARJORIE LYKES	KAXP	3	34.5 N	11.7 W	12	01	17	10 NM	03	1020.4	21.0	22.2	3	3	34	8	26
SEALAND EXPRESS	K6JD	3	38.1 N	62.8 W	18	34	35	10 NM	02	1010.0	19.5	27.0	3	10	02	7	26
YUKON T-AO 152	NUOP	4	36.7 N	09.2 W	00	34	30	10 NM	01	1022.0	18.6	20.0	5	16.5	31	6	24.5
SEALAND EXPRESS	K6JD	4	38.0 N	57.9 W	06	34	32	10 NM	02	1005.2	18.5	27.0	3	10	36	7	29.5
AMERICAN ARCHER	KFCS	10	45.4 N	23.1 W	06	01	05	10 NM	02	1013.1	15.9	15.6	3	8	27	10	24.5
SEALAND INDEPENDENCE	WGJC	10	39.3 N	68.2 W	06	03	M 52			1002.0	18.0	21.0	2	10	03	3	10
	KHAG	10	39.7 N	62.0 W	18	03	M 43	.5 NM	80	0997.0	15.0	24.4	6	26	06	6	23
SEALAND PACER	KSLB	11	37.6 N	61.0 W	12	04	M 65	50 YD	82	0985.0	17.7	23.7	5	16.5	04	15	36
	KFCO	12	32.8 N	61.1 W	00	29	38	5 NM	82		22.8	26.1	8	16.5	35	10	34.5
SEALAND PACER	KSLB	12	34.9 N	63.6 W	06	36	M 35	2 NM	82	1000.3	22.2	23.7	5	16.5	36	10	32.5
RODRIGUES CABRILHO	CSOU	12	34.1 N	55.8 W	18	24	M 65	200 YD	92		24.0	26.0	4	16.5	24	4	16.5
	KFCO	13	34.5 N	61.0 W	00	33	30	5 NM	82	1001.4	21.2	25.6	XX	23	36	XX	26
SEALAND PRODUCER	WJBJ	13	49.0 N	14.5 W	12	29	M 50			0982.0	21.8	16.0	8	16.5	30	10	24.5
	SLUR	14	43.5 N	10.2 W	00	28	M 47	5 NM	29	1012.3	16.0	16.0	8	24.5	30	8	24.5
	DSFO	14	33.5 N	51.5 W	00	23	27	5 NM	01	1010.0	25.0	25.0	15	16.5	23	15	26
SEALAND PRODUCER	WJBJ	14	48.8 N	16.6 W	06	33	M 40	5 NM	16	1007.5	13.5	15.0	6	19.5	31	31	26
SEALAND LEADER	WSNH	16	45.0 N	08.5 W	06	20	04	2 NM	62	0997.0	16.0	15.0	6	6.5	20	8	26
AMERICAN ACCORD	KFEZ	16	47.2 N	14.7 W	18	27	56	5 NM	02	0999.0	12.8	15.5	6	19.5	27	24	44
AMERICAN ACCORD	KFEZ	17	46.3 N	18.0 W	06	27	40	5 NM		1000.0	12.6	14.5	6	19.5	27	24	37.5
DOCTOR LYKES	KHNB	18	47.6 N	09.4 W	12	31	25	10 NM	02	1010.0	17.8	13.4	5	8	30	11	24.5
LASH ATLANTICO	WEZU	20	36.6 N	40.6 W	06	05	M 30	10 NM	03	1027.0	18.8	22.2	3	5	34	13	42.5
AMERICAN ARCHER	KFCS	21	47.3 N	31.8 W	12	29	25	10 NM	03	1023.2	12.0	13.1	5	11.5	27	12	24.5
SEALAND PACER	KSLB	22	44.7 N	40.2 W	18	24	M 60			1004.0	19.0	17.3	10	14.5			
LASH ATLANTICO	WEZU	23	38.0 N	66.7 W	06	36	M 25	10 NM	01	1019.2	16.6	23.3	3	5	36	13	37.5
AUSTRAL ENVOY	WPGK	24	35.7 N	74.5 W	18	04	45	1 NM	16	1012.3	20.6	25.0	7	14.5	03	9	24.5
CHERRY VALLEY	WIBK	25	36.8 N	71.6 W	00	08	55	2 NM	07	1014.5	20.5	23.3	12	34.5	08	12	34.5
AUSTRAL ENVOY	WPGK	25	36.4 N	74.5 W	00	05	48	2 NM	14	1013.2	16.2	17.0	7	23	06	9	24.5
AMERICAN ARGOSY	KFCX	26	49.4 N	11.2 W	12	24	40	5 NM	02	1012.8	12.8	12.8	6	8	26	8	28
RESOLUTE	KFDZ	27	49.4 N	10.1 W	00	22	30	> 25 NM	03	1020.0	12.2	12.2	8	10	27	12	24.5
AMERICAN ARGOSY	KFCX	28	47.3 N	23.5 W	00	21	40	10 NM	02	1008.8	12.2	13.9	6	14.5	24	8	24.5
SEALAND EXPRESS	K6JD	28	48.9 N	21.8 W	18	18	M 40	200 YD	64	0987.6	13.5	13.0	6	11.5	18	20	29.5
	GR. LAKES	OCT.															
BURNS HARBOR	WQZT049	20	47.8 N	88.7 W	18	36	M 60	200 YD	86		0.0	7.0	6	8			
JOHN DYKSTRA	WE6851	21	44.2 N	83.1 W	00	23	M 52	10 NM	02		8.0	11.0	10	11.5			
	ATLANTIC	NOV.															
EXPORT PATRIOT	WCJY	1	37.5 N	32.4 W	18	01	25	10 NM		1027.3	16.7	21.1	XX	3	36	12	32.5
	9UDD	3	45.3 N	28.0 W	18	29	M 25	1 NM	54	1009.0	13.0	14.5	14	29.5	23	6	16.5
	9UDD	5	41.6 N	41.9 W	12	26	M 34	5 NM	02	1025.0	20.0	19.0	6	24.5			
SINCLAIR TEXAS	HO3975	5	24.1 N	87.5 W	18	01	28	5 NM	01	1021.0	22.0		4	11.5	02	6	24.5
	WJDC	5	24.5 N	88.4 W	18	36	50	10 NM	02	1002.2	25.0	25.0	6	16.5	06	6	16.5
SINCLAIR TEXAS	HO3975	6	23.3 N	87.5 W	00	02	25	5 NM	03	1019.0	22.0		4	11.5	03	6	24.5
ULTRASEA	WJDC	6	25.7 N	90.0 W	10	36	50	10 NM	02	1002.3	18.9	25.0	6	16.5	06	6	19.5
	WJCG	9	50.0 N	25.9 W	12	26	35	10 NM		0993.0	14.4	10.0	3	10	24	12	26
EXXON BANGOR	KEAM	9	30.6 N	79.7 W	18	05	24	10 NM	07	1012.2	23.2	26.7	9	5	03	10	24.5
ULTRASEA	WJCG	10	50.2 N	14.1 W	18	23	35	5 NM	11	1010.8	14.4	8.8	4	13	26	10	32.5
AMERICAN ALLIANCE	KFEM	13	49.1 N	16.8 W	12	30	44	5 NM	02	1020.0	8.4	11.7	8	21	30	12	24.5
ACADIA	ICDR	13	40.9 N	58.3 W	18	02	40	1 NM	80	1002.5	18.0	22.0	XX	26			
AMERICAN ALLIANCE	KFEM	17	45.3 N	51.7 W	00	27	60			1009.0	7.8	6.1	10	32.5	27	10	34.5
ULTRASEA	WJCG	17	47.8 N	08.0 W	12	27	30	10 NM		1024.4	13.4	10.0	3	6.5	32	12	26
ULTRASEA	WJCG	18	45.3 N	15.5 W	12	27	20	2 NM	10	1022.0	15.0	11.2	3	6.5	27	12	32.5
SEALAND PACER	KSLB	21	45.2 N	35.2 W	06	29	M 20	10 NM	80	1026.8	8.4	14.0	7	5	29	8	47.5
LASH PACIFICO	WIEE	22	33.9 N	56.1 W	06	10	40	5 NM		1014.0	22.2	22.2	9	19.5	09	12	24.5
AMERICAN ARGOSY	KFCX	24	48.3 N	08.1 W	13	25	42	2 NM	81	1003.0	10.6	13.3	7	24.5			
AMERICAN ARGOSY	KFCX	25	45.9 N	16.4 W	12	30	35	10 NM	16	1015.0	7.8	13.3	6	21	30	7	29.5
AMERICAN ARGOSY	KFCX	26	44.9 N	21.4 W	00	31	25	10 NM	15	1024.0	10.6	13.3	6	16.5	31	7	28
USNS BARTLETT	D5NO	26	46.9 N	43.1 W	12	29	M 30	5 NM	02	1022.5	3.5	9.5	7	13	31	23	24.5
	NBAD	26	33.3 N	09.5 W	15	34	M 18	5 NM		1019.0	17.8	18.9	3	6.5	32	7	26
	WSDC	27	13.0 N	81.3 W	12	10	38	5 NM	03		26.7	26.7	4	6.5	10	9	24.5
	D5NO	28	49.5 N	28.1 W	18	19	M 44	2 NM		1004.5	13.5	15.5	8	23	19	20	26
	D5NO	29	49.6 N	26.5 W	00	19	M 44	.5 NM		1003.5	14.0	14.5	8	24.5	20	20	28
AMERICAN ARGOSY	KFCX	30	41.3 N	60.5 W	12	27	30	10 NM	01	1008.0	12.8	18.9	5	13	25	7	24.5
ADM WM M CALLAGHAN	K6YE	30	40.2 N	54.9 W	18	30	40	2 NM	82	1005.8	20.0	20.0	5	11.5	22	8	24.5

Vessel	Nationality	Date	Position of Ship: Lat. deg.	Position of Ship: Long. deg.	Time GMT	Wind: Dir. 10°	Wind: Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C.: Air	Temperature °C.: Sea	Sea Waves+: Period sec.	Sea Waves+: Height ft.	Swell Waves: Dir. 10°	Swell Waves: Period sec.*	Swell Waves: Height ft.
	ATLANTIC	DEC.															
AGUADILLA	KADP	1	45.8 N	33.9 W	18	14	65	5 NM	58	0997.5	14.4	16.7	5	11.5	16	8	19.5
RODRIGUES CABRILHO	CSDU	4	38.7 N	51.1 W	12	04	55	5 NM	80	1024.0	13.0	22.0	3	6.5	04	5	13
AMERICAN ACCORD	KFEZ	4	41.2 N	57.6 W	12	13	15	10 NM	02	1029.5	10.0	23.0	2	3	07	12	57
	WSDC	4	12.6 N	80.5 W	12	05	40	5 NM	07		26.7	26.7	5	10	08	8	26
CYGNUS	WSDF	4	32.4 N	52.4 W	12	01	48	10 NM	95	1012.5	18.3		8	23	01	14	31
CYGNUS	WSDF	5	31.1 N	55.7 W	00	04	40	10 NM	01	1018.2	18.2	24.0	7	18	01	13	26
ANNIE JOHNSON	SLFT	5	26.5 N	52.9 W	12	36	50	5 NM	01	1017.0	26.0	26.4					
SEALAND EXPRESS	KGJD	9	44.2 N	38.8 W	12	29	M 50	5 NM	02	1020.0	6.4	16.0	4	13	29	6	19.5
SEALAND EXPRESS	KGJD	10	45.5 N	33.0 W	00	29	M 39	10 NM	01	1024.6	8.0	13.0	4	10	30	8	29.5
TFL FREEDOM	9VXX	11	49.3 N	32.9 W	06	26	M 65			1000.2	5.0	10.0					
	SLFV	11	41.0 N	12.4 W	12	24	M 16	10 NM	01	1031.2	15.5	19.0	5	5	33	25	24.5
TFL JEFFERSON	9VBS	12	45.6 N	22.5 W	11	29	M 40	10 NM	02	1022.0	11.5		10	19.5	32	15	26
TFL FREEDOM	9VXX	12	49.5 N	17.6 W	18	31	M 43	5 NM	01	1000.0	10.0	12.8	10	11.5	32	20	29.5
EDGAR M QUEENY	KEOC	12	36.6 N	74.2 W	18	01	48	5 NM	50	1002.2	10.0	16.1	5	8	01	6	13
MOBILGAS	KOHD	12	35.9 N	74.7 W	18	10	50	2 NM	18	1001.4	8.3	17.8	2	13	02	10	19.5
MOBILGAS	KOHD	13	36.4 N	74.9 W	06	33	35	5 NM	01	1016.6	3.3	13.9	XX	10	35	10	24.5
MAUMEE	NSNF	13	46.6 N	11.1 W	06	34	40		01	1003.0	12.2	12.2	8	24	27	10	44
	DSNO	13	47.9 N	09.8 W	12	36	M 33	5 NM		1010.5	12.0	14.5	6	16.5	28	19	24.5
SEALAND ADVENTURER	KSLJ	13	38.9 N	55.3 W	12	19	M 40			1009.2	21.0	20.0	7	16.5	19	13	24.5
AXEL JOHNSON	SMPN	13	47.7 N	10.3 W	12	01	40	5 NM	02	1012.0	10.0	12.6	4	13	36	8	32.5
	HBFA	15	36.2 N	50.0 W	18	20	M 29	5 NM	50	1015.5	19.0	22.0	4	8	18	10	29.5
SEALAND PACER	KSLB	16	36.6 N	55.8 W	06	01	50	5 NM	02	1018.6	15.6	18.8	5	8	01	7	13
SEALIFT ARABIAN SEA	NFKQ	16	57.2 N	31.9 W	18	28	50	2 NM	26	1005.5	0.0	7.8	4	8	28	10	26
SEALIFT ARABIAN SEA	NFKQ	17	54.8 N	29.7 W	06	28	50	2 NM	26	1001.6	0.0	7.8	4	8	28	10	26
CYGNUS	WSDF	18	45.1 N	07.4 W	12	31	40	5 NM	01	1022.5	10.1		6	13	33	8	24.5
USNS BARTLETT	NBAD	19	35.2 N	63.2 W	18	20	M 21	5 NM	81	1006.5	19.4	20.6	4	8	22	9	24.5
FALSTRIA	OYBG	19	48.1 N	08.6 W	18	27	M 42		81	0992.2	14.0	9.8	10	29.5			
SEALAND INDEPENDENCE	WGJC	20	49.1 N	09.2 W	00	31	48	5 NM	01	0992.0	9.0	9.0	6	19.5	31	10	23
	HBFA	20	46.6 N	21.5 W	12	31	M 30	5 NM	01	1016.0	8.3	13.0	5	18	32	15	36
MEONIA	OXON	20	45.8 N	19.8 W	12	29	M 28	5 NM	02	1015.0	12.6		2	1.5	28	6	32.5
ALLTRANS EXPRESS	9VPU	20	49.2 N	18.3 W	18	32	M 45	10 NM	03	1006.2	9.0	13.7	11	19.5	31	14	26
MAYAGUEZ	KAAI	20	49.0 N	07.0 W	18	28	55	5 NM	29	0992.2	8.9	10.0	4	16.5	27	10	36
RESOLUTE	KFDZ	21	49.5 N	05.0 W	00	28	43	5 NM	18	0988.8	6.7	10.0	6	26	28	6	28
AMERICAN LEADER	KFEJ	21	45.9 N	23.1 W	00	34	30	10 NM	25	1022.5	10.0	12.2	5	10	32	12	29.5
SEALAND LEADER	WSNH	21	40.1 N	62.3 W	00	21	50	2 NM	82	0998.6	18.0	16.0	4	10	22	8	23
ALLTRANS EXPRESS	9VPU	21	49.4 N	11.6 W	12	36	M 42	5 NM		1002.0	10.5	13.4	10	19.5	30	14	26
	HBFA	21	47.4 N	15.1 W	12	32	M 35	5 NM	27	1010.3	8.8	12.0	5	18	33	15	32.5
AMERICAN ACE	KFCV	21	46.4 N	09.9 W	18	32	40	10 NM	27	1005.0	8.9	12.8	5	13	31	7	26
	HBFA	22	48.3 N	08.5 W	12	32	M 23	5 NM		1016.4	9.9	12.0	5	13	33	15	24.5
LASH ATLANTICO	WEZU	27	39.7 N	58.9 W	12	33	M 48	10 NM	01	1017.3	11.1		XX	28	30	XX	32.5
MAYAGUEZ	KAAI	27	38.9 N	53.3 W	18	33	48	2 NM	91	1008.0	17.8	19.4	3	11.5	33	8	42.5
MAYAGUEZ	KAAI	28	38.7 N	54.7 W	00	33	40	5 NM	02	1022.7	11.1	17.8	4	10	34	8	46
HESS VOYAGER	KNFE	28	35.7 N	73.0 W	00	18	15	10 NM	03	1027.8	20.6	21.2	6	3	18	18	29.5

+ Direction of sea waves same as wind.....
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

Continued from page 122

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS OCTOBER, NOVEMBER, DECEMBER, 1982

SHIP NAME	VIA RADIO	VIA MAIL	SHIP NAME	VIA RADIO	VIA MAIL	SHIP NAME	VIA RADIO	VIA MAIL	SHIP NAME	VIA RADIO	VIA MAIL
PRESIDENT MADISON	100	155	PRESIDENT MC KINLEY	13	171	PRESIDENT PIERCE	81	142	PRESIDENT POLK	16	32
PRESIDENT ROOSEVELT	31		PRESIDENT TAFT	74	100	PRESIDENT TAYLOR	25		PRESIDENT TRUMAN	29	64
PRESIDENT TYLER	57	119	PRESIDENT VAN BUREN	31	43	PRESIDENT WILSON	8		PRIDE OF TEXAS	4	
PRINCE OF TOKYO	26		PRINCE WILLIAM SOUND	33	157	PROVINCIA DE EL ORO	3	14	PUEBLA	57	
PUNTA BRAVA	31		PUNTA MALVINAS	14		QUATSINO SOUND		225	QUINTINA	45	
RAINIER	9		RALPH B JOHNSON	4		RAMBLER	1		RED ARROW	27	30
RELIANCE WMEC 615		20	RESEARCHER	132	143	RESOLUTE	65	126	RICHARD	34	55
ROBERT E LEE	10	8	RODRIGUES CABRILHO	38	45	ROSE	1	197	ROSE CITY	17	
ROSINA TOPIC		145	ROYAL VIKING SEA	18	33	ROYAL VIKING SKY	12	15	RUSH WMEC 723	2	31
RUTH LYKES	71		SACRAMENTO	41	36	SALVADER	27	61	SAM HOUSTON	10	6
SAMOA	76	122	SAMUEL S	7		SAN JUAN	62	157	SAN MARCOS	96	87
SAN PEDRO	27	50	SANKOSRAIN	15		SANSINENA II	35	33	SANTA ADELA	19	31
SANTA BARBARA	12	52	SANTA CLARA	20	13	SANTA CRUZ	64	109	SANTA ELENA	4	27
SANTA FE	67	83	SANTA JUANA	20	46	SANTA LUCIA	12	20	SANTA MAGDALENA	14	
SANTA MARIA	39	159	SANTA MARIANA	13	55	SANTA MERCEDES	31	18	SAPPHIRE	29	46
SARGODHA	49	101	SAUDI MAKKAH	80	27	SAUDI RIYADH	39	54	SCANDINAVIAN HIGHWAY	9	24
SCILLA	18		SEA LAND VOYAGER	85	145	SEALAND ADVENTURER	73	179	SEALAND CONSUMER	46	105
SEALAND DEFENDER	39	174	SEALAND DEVELOPER	62	127	SEALAND ECONOMY	63	165	SEALAND ENDURANCE	46	155
SEALAND EXPRESS	52	148	SEALAND FREEDOM	47	175	SEALAND INDEPENDENCE	80	154	SEALAND INNOVATOR	32	85
SEALAND LEADER	55	172	SEALAND LIBERATOR	25	130	SEALAND PACER	19	151	SEALAND PATRIOT	71	126
SEALAND PIONEER	48	176	SEALAND PRODUCER	40	153	SEALAND VENTURE	54	82	SEALIFT ANTARTIC	2	6
SEALIFT ARABIAN SEA	35	43	SEALIFT MEDITERRANEAN	21		SEAPAC LEXINGTON	17	27	SEATTLE	38	31
SEDGE WLB 402	27		SEPTA	32	69	SHELDON LYKES	4		SHERMAN WMEC 720	6	
SHIRLEY LYKES	10	33	SHUNWIND	28	139	SIENA	110	225	SILAS BENT T-AGS 26	1	152
SIMBA	76	80	SINALOA	25	45	SINCERE NO 5	2		SINCLAIR TEXAS	30	67
SKAUGRAN	44	155	SKOUBORO	76	152	SOCONY VACUUM	11	28	SONIO INTREPID	47	130
SOLON TURMAN	10	4	SOUTH LIGHT	7		SOUTHWEST CAPE	48		SPRAY DERRICK	12	
STAR DIEPPE	73		STAR HONGKONG	46		STARWARD	4		STELLA LYKES	14	30
STOLT LLANDAFF	17	101	STONEWALL JACKSON	13	39	STORIS WAGB 38	3		STREAM DOLPHIN	33	
STREAM HAWSER	21		SUGAR ISLANDER	12	73	SUNDEW WLB 404		7	SURVEYOR	106	72
SUSQUEHANNA	48	9	SWEETBRIER WLB 405	4		T F L INDEPENDENCE	18	81	T F L LIBERTY		3
TALISMAN	19		TAMAROA WMEC-166	64	88	TANEY WMEC 37	21		TAURUS	22	129
TEXACO BHENT	82		TEXACO NEW YORK		26	TEXACO RHODE ISLAND		66	TEXAS TRADER	20	103
TFL DEMOCRACY	11	44	TFL FRANKLIN		17	TFL FREEDOM	13	46	TFL ITALY	178	
TFL JEFFERSON	22	9	THOMAS G THOMPSON	17	84	THOMAS WASHINGTON	8	47	THOMPSON LYKES	31	33
THOMPSON PASS	13	34	TILLIE LYKES	28	86	TONSINA	12		TOWER BRIDGE	75	184
TOWNSEND CROMWELL	105	133	TRANSCOLORADO	7	37	TRANSCOLUMBIA	2	18	TRIUMPH	74	
TYSON LYKES	56	186	ULTRASEA	11	48	UNIVERSE	12		USCGC RESOLUTE WMEC 62	29	
USNS APACHE	1		USNS BARTLETT	46	89	USNS COMET TAKO 7	34	78	USNS MOHAWK		6
USNS RIGEL TAF58	6		USNS SIRIUS	15		USNS TRUCKEE TAO-147	54	38	USNS WACCAMAW	18	69
VALIANT	101	3	VAN CONQUEROR	36	16	VAN FORT	49		VAN HAWK	68	95
VAN TRIUMPH	9		VELMA LYKES	58	27	VENTUROUS WPC 625	9		VIOLET	34	41
WALCHAND	8		WALTER RICE	7	13	WASHINGTON TRADER	4	48	WECOMA	29	121
WENDY FOSS		59	WESER EXPRESS	25	28	WESTERN SUN		13	WESTWARD		9
WESTWARD VENTURE	128	169	WESTWIND WAGB 281	37	28	WILLIAM A REISS	88	71	WILLIAM CLAY FORD		2
WILLIAM E MUSSMAN	24	75	WILLIAM HOOPER	17	35	WILMINGTON BETTY	43	119	WINTER STAR	3	14
WORLD CANDOUR	18		YOCONA WMEC 168		13	YOUNG SEAGULL	48	86	YUKON T-AO 152	27	16
ZIM HONGKONG	22		ZOELLA LYKES	20	6						

SUMMARY: GRAND TOTAL VIA RADIO 20825 GRAND TOTAL VIA MAIL 38063

North Pacific Selected Gale and Wave Observations

October, November and December 1982

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
	PACIFIC	OCT.															
MAIN EXPRESS	3EED	3	35.9 N	146.8 E	06	04	M 40	2 NM	62	1001.5	19.5	24.0	3	16.5	04	9	26
MAIN EXPRESS	3EED	5	37.8 N	160.8 E	00	31	M 30	10 NM	01	1008.1	16.8	24.0	7	11.5	36	11	32.5
	OWDT	5	48.2 N	149.5 W	00	27	55	1 NM	81	0986.0	11.8	9.0	10	32.5	27	12	32.5
	PHTQ	5	49.9 N	148.0 W	06	27	50	2 NM	81	0990.8	9.2						
CHEVRON CALIFORNIA	=CGN	5	46.1 N	149.0 W	06	28	40	10 NM	01	1005.3		12.8			30	12	26
	KCAD	5	48.3 N	167.4 E	12	07	50	1 NM	21	0995.0	7.8	8.9	7	16.5	07	10	29.5
EASTERN DIAMOND	HDDT	5	48.9 N	179.9 E	18	09	M 45			0997.0	7.5	8.0	15	28	09	18	34.5
SEALAND FREEDOM	=GJW	6	39.0 N	175.0 E	06	29	40	10 NM	02	1011.3	17.0	21.0	5	10	29	12	29.5
	KSEG	6	56.2 N	141.2 W	18	28	M 50	1 NM		0978.0	13.2	12.8	3	19.5	29	5	16.5
CHEVRON CALIFORNIA	=CGN	6	51.5 N	145.6 W	18	30	35	5 NM	16	1000.0	7.2	10.0	3	6.5	31	8	26
EXXON NEW ORLEANS	=NOM	6	55.0 N	137.5 W	18	25	M 48	10 NM	20	0983.0	9.8	12.0	5	6.5	27	12	18
SANSINENA II	=SIN	6	41.3 N	128.3 W	18	29	28	10 NM	15	1011.5	16.1	14.4	5	10	29	13	26
MAIN EXPRESS	3EED	7	39.4 N	179.0 W	06	30	M 30	10 NM	01	1015.0	15.5	18.0	8	13	31	14	29.5
EASTERN DIAMOND	HDDT	7	48.7 N	177.1 W	18	03	M 30			1006.5	7.5	8.0	XX	21	23	14	29.5
MAIN EXPRESS	3EED	8	39.9 N	172.4 W	00	30	M 30	10 NM	01	1011.0	16.0	15.0	5	10	28	10	26
RED APRON	SLTT	8	35.3 N	144.7 E	21	07	M 50	.25 NM	81	0984.0	20.0	22.0	12	29.5			
RED ARROW	SLTT	9	35.4 N	144.6 E	03	05	M 70	.25 NM	82		18.0	22.0	12	36	XX	9	28
RED ARROW	SLTT	10	35.4 N	144.6 E	00	02	M 18	5 NM	81	1019.5	17.5	23.0	10	16.5	05	6	26
QUATSINO SOUND	ELAW3	10	36.9 N	141.8 E	00	06	M 26	10 NM	02	1024.5	18.5	20.0	6	13	06	11	26
OCTA	A8G6	10	46.7 N	170.6 W	03	11	M 53	.25 NM	64	0985.9	10.0	11.0	5	19.5			
	OYBF	10	43.0 N	177.1 E	18	30	45	5 NM	15	0998.0	11.0		14	39			
CLARA MAERSK	OWIK	10	37.0 N	169.6 W	19	28	15	2 NM	63	1002.0	18.5	19.0	5	13	26	12	29.5
EASTERN DIAMOND	HDDT	11	48.5 N	155.9 W	00	13	M 50	.25 NM	51	0991.5		10.0	15	16.5	13	15	24.5
	OYBF	11	41.4 N	177.3 W	06	31	45	2 NM	10	1000.3	11.9		12	32.5			
AMERICAN APOLLO	KEGD	11	34.9 N	153.8 E	12	08	35	10 NM	02	1021.0	20.6	23.3	6	14.5	08	6	26.5
PRESIDENT FILLMORE	KPDH	11	48.6 N	179.3 E	18	32	35	10 NM	02	1012.0	8.9	1.0	4	8	08	13	29.5
DISCOVERER OSS	=YEA	11	54.4 N	164.9 W	18	01	M 50	5 NM	02	0995.2	2.8	7.2	4	19.5			
CLARA MAERSK	OWIK	11	37.5 N	174.0 W	20	31	38	10 NM	81	1017.2	16.2	20.0	10	23	30	12	34.5
	YVYT	12	36.4 N	176.7 W	00	32	M 28	10 NM	07	1025.0	17.0	19.0	3	6.5	32	8	39
PRESIDENT FILLMORE	KPDH	12	48.5 N	178.3 W	00	31	30	10 NM	02	1011.4	7.8	8.9	4	8	06	12	26
MOBIL ARCTIC	KSPY	12	60.0 N	145.8 W	00	11	50	.5 NM	60	0992.9	7.5	8.8	4	10	11	9	14.5
CLARA MAERSK	OWIK	12	37.5 N	175.0 W	00	31	38	10 NM	02	1020.0	19.0		10	23	30	12	32.5
	OY6F	12	40.9 N	168.5 W	00	31	30	10 NM	02	1000.9	10.0	11.0	8	24.5			
PRESIDENT TYLER	=E2M	12	39.4 N	178.5 E	00	34	M 32	10 NM	02	1023.8	15.0	15.6	5	14.5	34	8	39
CLARA MAERSK	OWIK	13	38.5 N	169.3 E	18	20	35	2 NM	65	1008.5	18.5	18.0	8	19.5	19	9	29.5
SANSINENA II	=SIN	13	47.4 N	134.8 W	18	02	06	2 NM		1025.0	15.0	12.8	0	0	26	15	28
CLARA MAERSK	OWIK	14	38.2 N	167.3 E	00	28	30	10 NM	03	1011.5	20.0		8	19.5	19	9	29.5
DISCOVERER OSS	=YEA	14	55.0 N	164.8 W	06	23	M 39	5 NM	02	1015.9	6.3	6.7	6	26			
RED APRON	SLTT	16	50.6 N	178.6 E	00	34	M 31	10 NM	01	1020.5	6.0	9.5	5	10	34	10	24.5
BARBER TERRIER	LFEA	16	38.6 N	144.5 W	18	04	M 52	10 NM	81	1020.0	18.0	17.3	6	26	36	10	29.5
BARBER TERRIER	LFEA	17	38.5 N	142.5 W	00	05	M 52	5 NM	80	1019.5	19.0		6	26	36	10	29.5
PRESIDENT PIERCE	=UBV	18	47.9 N	173.1 E	00	15	45	2 NM	20	1015.0	10.0	7.8	7	16.5	18	11	24.5
PACMERCHANT	=MCB	20	48.7 N	171.1 E	00	05	M 50	.5 NM	62	1022.5	8.0	9.0	9	16.5	05	9	29.5
	KGJF	20	37.3 N	145.9 E	12	14	M 50	2 NM	15	1000.5	21.0	11.0	7	18	13	12	29.5
MAIN EXPRESS	3EED	21	53.4 N	148.3 W	00	34	M 24	10 NM	01	1012.0	6.8	9.0	5	10	31	12	26
SEAPAC LEXINGTON	ZCKD	21	53.5 N	149.5 W	00	34	33	5 NM	60	1011.5	7.0	12.0	7	11.5	31	8	24.5
PACIFIC ARROW	JGFM	21	35.7 N	174.5 W	21	12	M 26	2 NM	15	1018.3	20.0		7	13	07	8	32.5
SEAPAC LEXINGTON	ZCKD	22	52.5 N	159.3 W	00	34	40	2 NM	15	1003.0	7.0	11.0	7	18	34	7	26
GALVESTON	KRGA	22	49.0 N	126.0 W	12	14	35	5 NM	20	0988.6	12.3	11.1	4	19.5	14	14	26
MAIN EXPRESS	3EED	22	52.9 N	164.4 W	18	35	M 50	5 NM	25	1016.0	4.0	8.0	10	16.5	35	14	19.5
DISCOVERER OSS	=YEA	23	54.5 N	163.8 W	06	34	M 60	5 NM	02	1009.4	0.8	6.1	4	13			
CHEVRON HAWAII	KNFD	23	53.4 N	134.1 W	12	14	M 48	2 NM			12.4	12.8					
EXXON NEW ORLEANS	=NOM	23	52.0 N	136.1 W	18	19	M 25	10 NM	03	0977.4	9.0	12.0	4	11.5	19	13	24.5
AMERICAN AQUARIUS	=YBI	23	42.4 N	153.4 W	18	34	30	10 NM	02	1005.0	8.9	13.9	5	13	34	6	24.5
EXXON SAN FRANCISCO	KAAC	24	47.1 N	140.1 W	00	17	35	10 NM	15	0998.1	15.0	13.9	8	16.5	21	14	28
PORTLAND	=NOF	24	53.5 N	146.8 W	00	18	M 50	10 NM	01	0992.0	7.3	12.3	6	10	12	8	13
AMERICAN AQUARIUS	=YBI	24	39.6 N	146.2 W	18	27	30	10 NM	02	1005.0	12.2	15.6	5	13	29	6	32.5
AMERICAN AQUARIUS	=YBI	25	38.2 N	141.9 W	06	30	30	10 NM	02	1008.5	12.8	16.7	5	13	30	6	32.5
AMERICAN AQUARIUS	=YBI	26	38.2 N	127.0 W	18	30	25	10 NM	02	1022.0	13.9	16.1	5	10	30	6	26
AMERICAN AQUARIUS	=YBI	27	38.1 N	125.2 W	00	32	25	10 NM	02	1024.8	17.2	15.6	5	10	32	6	26
MAIN EXPRESS	3EED	27	37.1 N	148.3 E	18	28	M 51	10 NM	01	1021.0	16.5	20.0					
SANSINENA II	=SIN	28	46.4 N	133.2 W	18	03	40	5 NM	81	1007.1	10.6	11.7	6	10	02	10	32.5
SANSINENA II	=SIN	30	54.0 N	143.2 W	18	26	22	10 NM	25	1001.0	7.7	7.8	4	8	28	12	29.5

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C.		Sea Waves*		Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.*	Height ft.
	PACIFIC	NOV.															
EASTERN WORLD	ELVA	1	44.5 N	160.0 E	22	19	N 40	.5 NM	62	1007.5	16.0	13.0	6	11.5	20	12	24.5
PACIFIC VENTURE	HOVS	2	40.7 N	147.8 E	06	31	N 49	5 NM	07	1019.8	11.0	8.0	6	16.5	31	8	24.5
MOBIL ARCTIC	KSPY	3	55.8 N	140.6 W	12	11	25			0997.0	9.0	6.6			11	8	32.5
SANSINENA II	WSIN	3	54.0 N	140.9 W	18	23	27	10 NM		0983.6	7.2	7.2			13	11	29.5
ATIGUN PASS	KSFJ	4	59.5 N	145.6 W	00	05	50	2 NM	81		6.8	8.8	15	28	10	15	28
KEIYO	JKHO	4	58.2 N	177.4 W	06	27	N 37	> 25 NM	02	1005.5	8.5	8.0	11	19.5	27	14	24.5
CLARA MAERSK	OWIK	4	37.5 N	146.7 W	06	27	22	10 NM	03	1019.0	17.5	20.0	7	8	29	10	26
	OXPS	4	50.9 N	178.4 W	06	29	40	10 NM	01	1001.5	6.0		10	26			
PRESIDENT TAFT	WLDT	4	54.3 N	175.8 W	12	26	48	5 NM	80	0992.0	3.3	5.6	4	10	26	12	26
BUILDER	KEXB	5	14.7 N	178.4 E	06	08	20	10 NM	02	1008.0	28.0	29.4	6	3	07	10	29.5
	D9FE	5	13.9 N	95.7 W	16	01	N 42			1011.5	30.0	27.0	8	32.5	02	8	39
MOBILOIL	WMTO	6	47.9 N	132.9 W	23	27	N 36	5 NM	18	1012.5	8.8	11.1	5	11.5	29	8	29.5
ALASKA STANDARD	WMDN	7	58.9 N	152.2 W	00	29	50	10 NM	02	1013.8	1.7	9.4	8	29.5	28	8	24.5
MOBILOIL	WMTO	7	48.8 N	133.8 W	06	27	N 30	10 NM	18	1007.8	8.3	10.5	4	10	28	8	26
	3FFP	7	41.5 N	155.0 E	17	18	N 50			1015.0	12.0	1.0	3	3	36	6	3
ARCO FAIRBANKS	WGWR	8	45.6 N	130.0 W	00	30	28	10 NM	95	1007.3	11.1	13.3	4	10	31	10	24.5
PACIFIC VENTURE	HOVS	9	46.0 N	178.2 W	12	19	N 47	.25 NM		1003.5	11.5	5.0	8	16.5	19	10	24.5
MAIN EXPRESS	3EED	10	41.8 N	169.8 E	12	23	N 48	5 NM		1002.0	14.5	14.0					
	OXFR	10	44.4 N	151.4 W	12	34	47	2 NM	82	1007.0	10.4	16.0	10	26			
CHEVRON MISSISSIPPI	WXBR	10	42.7 N	149.4 W	18	29	35	2 NM	10	1010.2	10.5	11.5	2	10	30	12	26
SEALAND ENDURANCE	3FFP	11	45.6 N	178.2 E	04	26	N 35	2 NM	62	0993.0	6.0	4.0	6	26	26	6	26
SURVEYOR	KGJX	12	51.2 N	157.4 W	06	16	N 35	5 NM	58	0999.7	7.8	7.8	8	19.5	16	15	28
PRESIDENT HOOVER	WTES	12	59.5 N	179.6 W	12	35	N 44	50 YD		0972.5	3.0	9.4	7	6.5	03	12	24.5
	WTST	12	53.6 N	175.6 E	12	31	N 60	5 NM	02	0993.7	1.2	6.7	10	49	32	10	49
	3FFP	13	42.9 N	167.5 W	19	18	N 20	2 NM	62	1017.9	13.5	8.0	8	24.5	18	8	24.5
	NJOV	14	13.1 N	97.9 W	12	06	15	10 NM	02	1006.5	26.7		2	5	07	10	24.5
	NJOV	15	12.2 N	98.0 W	00	05	10	10 NM	02	1006.5	26.7		2	5	07	9	24.5
	3FFP	15	43.5 N	155.2 W	18	23	N 28	.5 NM	10	1013.4		10.0	4	5	23	13	24.5
	D8PU	16	49.7 N	129.1 W	19	29	N 29			0990.1	9.3	10.2	7	8	31	13	24.5
ARCTIC TOKYO	SLJT	17	48.7 N	156.0 E	00	28	N 40	1 NM	83	1012.0	0.0	3.0	14	26			
	3FFP	17	42.8 N	141.0 W	17	32	N 18	5 NM		1001.5	14.0		3	5	12	12	24.5
ORIENTAL TAIO	A8CV	18	53.2 N	172.4 E	06	27	N 48			0995.0	2.0	3.0	12	16.5	25	12	19.5
	3FFP	19	39.2 N	130.4 W	09	30	N 29	5 NM	01	1010.4	13.0	14.0	3	16.5	16	14	24.5
	WGJF	20	37.5 N	169.0 W	00	34	N 49	5 NM	03	1009.1	13.9	15.0	6	11.5	33	9	14.5
AMERICAN TRADER	WEZH	21	44.8 N	151.5 W	00	11	50	2 NM	59	0981.5	11.1	11.7	3	13	12	6	19.5
	H8FW	21	49.1 N	179.8 E	12	07	41			0968.0	4.0	7.0	12	24.5	12	11	26
SEALAND ENDURANCE	KGJX	21	51.2 N	152.5 W	18	11	N 45	5 NM	51	0994.8	12.2	7.2	7	19.5	12	14	32.5
CLARA MAERSK	OWIK	21	46.0 N	176.1 E	18	29	42	5 NM	90	0989.0	4.5		9	16.5	28	10	24.5
CHEVRON MISSISSIPPI	WXBR	22	47.0 N	148.9 W	00	19	35	10 NM	02	0994.0	12.0	8.9	2	10	11	12	26
SEALAND ENDURANCE	KGJX	22	52.8 N	158.8 W	06	12	N 25	1 NM	90	0985.7		7.2	6	10	12	14	24.5
CLARA MAERSK	OWIK	22	46.1 N	178.5 W	06	27	50	2 NM	86	0978.0	5.0	8.0	14	24.5	26	15	34.5
	D9DR	22	44.1 N	175.5 E	11	29	N 55			0997.0	8.0		4	6.5	28	5	8
SEALAND DEVELOPER	KHRH	22	43.5 N	176.3 E	12	32	N 57	5 NM	26	1015.0	6.0	13.0	XX	42.5			
EASTERN DIAMOND	HODT	22	42.6 N	172.0 E	18	32	N 33			1012.0	5.0	13.0	13	11.5	32	25	32.5
PACIFIC VENTURE	HOVS	22	51.6 N	166.8 E	18	35	N 38	.5 NM	41	1019.5	4.5	0.0	7	14.5	35	10	24.5
	D8PU	22	53.3 N	176.8 E	23	01	N 40	2 NM		0998.1	4.1	5.0	9	13	21	13	28
	D9DR	23	42.8 N	179.4 W	00	29	N 55			0991.0	10.0		4	6.5	28	5	8
	SLEV	23	54.7 N	178.1 W	06	01	N 25	5 NM	83	1005.0	4.0	3.0	6	29.5			
EASTERN DIAMOND	HODT	23	42.0 N	175.4 E	06	30	N 39			1012.0	6.0		17	21	31	27	34.5
PACIFIC VENTURE	HOVS	23	49.1 N	159.2 E	12	12	N 34	.25 NM	73	1006.0	4.5	0.0	7	16.5	12	10	24.5
CLIFFORD MAERSK	OXZH	23	32.1 N	178.7 E	18	31	30	> 25 NM	02	1016.5	18.0		8	16.5	33	14	26
ASIA INDUSTRY	A8GI	24	37.2 N	175.3 W	00	31	N 40	10 NM	02	1003.5	16.0	18.0	6	13	32	14	24.5
CLIFFORD MAERSK	OXZH	24	32.3 N	176.8 E	00	31	22	> 25 NM		1017.9	18.2		8	11.5	32	14	29.5
	SLEV	24	51.8 N	167.8 E	06	04	N 22	5 NM	05	1010.0	3.0	3.0	6	26			
PACIFIC VENTURE	HOVS	24	44.5 N	150.3 E	18	27	N 32	1 NM	83	0986.5	2.0	0.0	9	16.5	27	10	19.5
	D8PU	25	50.0 N	158.8 E	00	10	N 35	.5 NM	12	0988.1	5.1	5.0	8	13	09	14	26
TOWER BRIDGE	D5NW	25	48.2 N	135.4 W	06	15	N 30	.5 NM	65	0995.5	11.0	8.0	7	8			
PACIFIC VENTURE	HOVS	25	42.8 N	147.4 E	06	31	N 62	1 NM	68	0985.5	4.0	1.0	12	19.5	31	12	24.5
SINALOA	OXNS	25	50.6 N	139.0 W	06	13	N 54	1 NM	63	0987.0	11.0	12.0	XX	29.5			
SEPTA	A8JO	25	49.0 N	148.0 W	18	28	N 48			0983.5	6.0	7.0	7	16.5	27	6	5
PACIFIC VENTURE	HOVS	26	40.4 N	144.3 E	00	32	N 49	5 NM	18	1012.5	8.0	1.1	10	19.5	32	15	28
CLIFFORD MAERSK	OXZH	26	34.1 N	161.3 E	06	28	40	5 NM	03	1006.8	17.0		16	32.5			
PRINCE WILLIAM SOUND	WSDX	26	59.9 N	146.0 W	06	10	60	10 NM	81	0988.0	5.6	8.9	4	16.5	11	8	18
	SLEV	26	43.7 N	150.8 E	12	34	N 22	5 NM	03	1006.0	3.5	5.0	9	24.5			
SEALAND ENDURANCE	KGJX	26	42.2 N	154.4 E	12	31	N 46	5 NM	15	0998.2	3.3	7.8	6	13	29	10	24.5
CLIFFORD MAERSK	OXZH	27	34.2 N	158.7 E	00	28	35	5 NM		1012.2	15.5		4	6.5	29	11	28
SEALAND ENDURANCE	KGJX	27	38.5 N	149.1 E	06	32	N 34	10 NM	15	1017.4	8.3	15.0	6	13	29	14	24.5
PRESIDENT TAFT	WLDT	27	35.0 N	162.3 E	18	28	35	10 NM	03	1012.0	15.0	18.3	7	14.5	28	12	26
PRESIDENT GRANT	WEZD	28	47.0 N	154.6 E	09	33	N 50	10 NM	16	1014.8	0.6	3.9	5	8	32	10	11.5
PRESIDENT TAFT	WLDT	28	35.2 N	173.2 E	18	24	35	10 NM	02	1008.5	16.1	18.3	7	14.5	27	12	26
SANSINENA II	WSIN	28	44.6 N	128.9 W	18	24	19	10 NM		0998.0	11.1	10.0	4	6.5	26	10	26
	KDBG	29	31.7 N	126.3 E	00	32	N 41	2 NM	63	1009.0	18.3	22.2	8	10	14	14	24.5
PRESIDENT TAFT	WLDT	29	35.5 N	176.0 E	00	29	33	10 NM	01	1009.1	16.1	19.4	6	11.5	26	12	24.5
PRESIDENT GRANT	WEZD	30	36.9 N	142.3 E	10	33	N 21	10 NM	02	1000.0	13.9	15.0	4	5	18	10	29.5
	SMXM	30	44.3 N	152.3 E	12	14	N 35	.5 NM	38	0991.5	10.8	5.0	8	14.5	14	10	16.5
SOHIO INTREPID	KACK	30	46.8 N	129.9 W	12	29	38	10 NM	15	0988.0	9.8	12.3	6	19.5	29	12	36
SEALAND DEFENDER	KGJB	30	41.5 N	127.1 W	12	29	35	10 NM	02	0988.9	8.0	16.0	3	10	30	6	32.5
PRINCE WILLIAM SOUND	WSDX	30	38.6 N	124.5 W	12	31	48	5 NM	02			12.5	15.0	8	16.5	30	10	14.5
	3EFQ	30	47.0 N	155.3 E	17	16	N 50			0992.0	6.0	4.0	10	14.5	16	10	16.5
MAIN EXPRESS	3EED	30	48.2 N	155.8 E	18	14	N 55	2 NM	65	0992.0	4.5	4.5					
CHEVRON HAWAII	KNFO	30	41.5 N	128.9 W	18	31	N 38	10 NM	01	0998.1	12.7	12.2	5	13	31	7	24.5
HARDANGER	LFF6	30	31.6 N	179.2 W	21	01	41	2 NM	07	1008.0	18.5		9	29.5			

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.°	Swell Waves Height ft.
	PACIFIC	DEC.															
CHEVRON HAWAII	KNFD	1	40.6 N	127.8 W	00	31	M 24	10 NM	02	1004.2	11.0	12.2			31	6	32.5
SKOUBORO	LION	1	42.1 N	146.8 E	00	29	40	> 25 NM	01	1004.0	10.0	11.5	10	23	25	12	24.5
LURLINE	WLVD	1	36.7 N	126.2 W	00	32	45	5 NM	02	1007.0	12.2	13.3	14	19.5	32	14	24.5
MAIN EXPRESS	3EED	1	46.3 N	153.5 E	06	27	M 48			0989.5	3.0	4.0	7	13	27	14	29.5
	D5BU	1	36.2 N	159.9 E	06	21	M 35	5 NM	08	1014.3	17.5	18.9	7	11.5	21	9	31
SEALAND DEFENDER	KGJB	1	46.5 N	130.5 W	06	30	43	10 NM	02	0998.1	9.0	12.0	4	11.5	30	8	32.5
SILAS BENT T-AGS 26	NNUD	1	22.9 N	179.3 E	06	34	M 25	5 NM	02	1014.6	21.5	21.5	4	16.5	34	9	26
ASIA BRAVERY	A8CM	1	52.5 N	166.0 E	11	15	M 55	.25 NM	24	0988.5	3.0	5.0	15	16.5	15	12	24.5
SHUNWIND	ELIQ	1	49.2 N	156.9 E	18	24	M 51	1 NM	60	0982.0	3.0	5.0	6	14.5	24	6	14.5
	KCAO	1	32.5 N	171.7 W	18	36	45	5 NM	15	1007.0	14.7	19.4	8	24.5			
	KSBG	1	29.9 N	117.2 W	18	34	M 30	5 NM		1010.0	17.8	15.0	4	16.5	31	31	47.5
TYSON LYKES	WSCJ	2	48.1 N	164.5 E	00	26	35	10 NM	01	0992.1	6.1	3.9	10	14.5	26	12	24.5
SOHIO INTREPID	KACK	2	56.6 N	140.8 W	06	31	12	10 NM	02	0995.3	3.3	8.3	2	5	28	9	26
ASIA BRAVERY	A8CM	2	51.3 N	163.1 E	11	24	M 55			0984.5	2.0	5.0	14	32.5	24	14	34.5
ANNA MAERSK	OYKS	2	52.0 N	168.1 E	18	24	50	5 NM	81	0984.5	6.4		12	19.5			
MAIN EXPRESS	3EED	3	38.4 N	144.4 E	00	34	M 27	10 NM	01	1012.5	10.8	6.0	5	13	28	9	24.5
ASIA BRAVERY	A8CM	3	50.1 N	161.3 E	11	27	M 47			1005.5	0.0	4.0	15	34.5	29	16	34.5
	H9QR	4	51.6 N	152.0 W	19	16	M 54	50 YD	24	0992.0	0.7						
SEALAND DEFENDER	KGJB	5	54.0 N	177.8 E	12	31	54	10 NM	88	0999.6	2.0	6.0	2	8	28	9	28
CHEVRON MISSISSIPPI	WXBR	6	49.5 N	151.1 W	18	17	30	5 NM	02	0988.5	8.5	6.5	2	10	18	11	32.5
SEALAND DEFENDER	KGJB	7	50.0 N	162.7 E	06	28	50	5 NM	88	0984.1	- 2.2	5.0	4	10	29	5	16.5
WESTWARD VENTURE	KHJB	7	55.1 N	138.8 W	18	16	M 50	5 NM		1010.9	7.3	7.3	5	13	16	7	16.5
AMERICA SUN	WNEJ	7	57.2 N	139.7 W	18	13	M 50	5 NM	02	1009.8	7.0	7.8	9	14.5	14	10	16.5
HOHSING BREEZE	3EOU	9	43.5 N	167.5 E	00	29	M 29	5 NM	87	1003.5	4.0	7.0	6	23	10	6	24.5
	ELAK	11	31.5 N	158.1 W	00	28	45	10 NM	03	1013.0	20.0	20.0	10	23	28	12	26
	3EEV	11	34.7 N	155.9 W	06	14	M 36	5 NM	01	1015.0	12.0	17.0	8	29.5	14	8	29.5
HOHSING BREEZE	3EOU	11	46.6 N	172.4 W	18	30	M 28	5 NM		0995.4	4.0	8.0	6	16.5	29	8	24.5
PRINCE WILLIAM SOUND	WSDX	11	59.7 N	145.6 W	18	09	50	5 NM		0989.5	5.6	6.0	3	14.5	09	12	23
BLUE OCEAN	JKQH	12	49.2 N	147.5 W	03	25	M 49	.5 NM	11	0985.5	7.0	6.0	7	16.5	25	6	14.5
HOHSING BREEZE	3EOU	12	47.1 N	169.0 W	06	29	M 48	.25 NM	85	0993.5	3.0	7.0	6	24.5	29	10	29.5
EXXON NEW ORLEANS	WNDM	12	54.4 N	138.8 W	18	21	M 26			0993.2	7.4	8.3	4	13	20	10	29.5
MING GLORY	BLHX	12	34.5 N	163.1 E	23	31	M 50			1014.0	23.0	20.0	8	23	24	8	23
GLACIER BAY	KACF	13	39.8 N	153.5 W	00	25	50	5 NM	81	1010.0	11.5	12.2	4	14.5	32	7	19.5
EXXON NEW ORLEANS	WNDM	13	53.5 N	137.9 W	00	18	M 33	5 NM	02	0996.4	7.5	8.3	4	11.5	19	6	32.5
MING GLORY	BLHX	13	34.5 N	160.8 E	06	21	M 40	200 YD	53	1011.0	20.5	20.0	8	21	25	8	24.5
	LFEL	13	38.8 N	165.2 W	12	24	54			1001.0	15.0		12	29.5			
	D9FE	13	41.5 N	163.9 W	18	27	M 50			0995.0	7.0	8.0	15	18	27	15	21
	H36X	13	36.6 N	163.8 W	18	24	M 45	2 NM	07	1007.0	16.3	14.0	10	24.5	26	10	24.5
	D9FE	14	41.1 N	162.0 W	00	28	M 52	1 NM	80	0998.0	7.0	8.0	15	32.5	28	15	23
EXXON NEW ORLEANS	WNDM	14	49.5 N	134.0 W	00	22	M 08	5 NM	02	0993.5	9.8	13.0	12	6.5	18	6	31
	ZCUT	14	50.1 N	146.3 W	00	12	60	.25 NM	62	0961.8	5.0	7.0	7	16.5	15	7	19.5
POLAR ALASKA	SLEU	14	53.5 N	177.4 E	12	28	M 48	5 NM		0985.0	1.0	3.0	10	8			
SEALAND ENDURANCE	KGJX	14	43.7 N	179.0 E	12	30	M 36	10 NM	70	1005.0	4.4	11.1	4	13	30	10	24.5
SKAUGRAN	LMUK	14	51.5 N	135.0 W	12	15	51	2 NM	62	0978.5	8.0						
HOHSING BREEZE	3EOU	14	49.8 N	151.2 W	18	32	M 45	5 NM	07	0955.0	5.0	8.0	6	16.5	28	8	24.5
SOHIO INTREPID	H36X	14	36.1 N	168.1 W	18	28	M 50	2 NM	07	1002.8	16.0	15.0	5	18	28	5	18
EXXON PHILADELPHIA	KACK	14	57.7 N	142.1 W	18	11	38	1 NM	55	0969.5	6.7	7.7	5	16.5	10	12	26
PACLADY	WNFJ	14	54.1 N	135.2 W	18	14	M 52	.25 NM	81	0972.0	9.0	10.0	8	14.5	12	13	19.5
DAFFODIL	D5HC	15	48.5 N	142.0 W	00	23	M 50			0965.0	8.0	10.0	7	10	23	14	49
	H3AG	15	36.1 N	162.0 W	00	28	M 50	200 YD	41	1002.5	14.0	16.0	15	31	28	14	29.5
SEALAND FREEDOM	S6CT	15	46.8 N	176.4 W	00	29	M 49	2 NM	88	0997.0	2.5	12.0	6	8	30	9	13
PRESIDENT TRUMAN	WGJW	15	45.9 N	124.9 W	00	18	50	2 NM	65	0995.8	13.0	14.0	5	11.5	18	8	23
	WLPL	15	40.7 N	166.5 W	00	30	55	5 NM	80	0997.0	7.9	12.3	3	13	32	4	13
	YCSE	15	45.1 N	125.4 W	00	21	M 50	.25 NM	63	0997.0	13.0	11.0	10	13	18	16	16.5
	ZCUT	15	52.0 N	153.1 W	06	32	55	.5 NM	07	0958.8	4.0	6.0	XX	26	04	XX	23
SEALAND ENDURANCE	KGJX	15	45.0 N	169.8 W	12	28	M 54	5 NM		0996.2	5.0	8.0	13	24.5	30	16	29.5
HOHSING BREEZE	3EOU	15	50.1 N	144.3 W	18	24	M 34	2 NM	16	0973.5	6.5	7.0	8	24.5	24	10	24.5
	SMKM	15	41.8 N	167.0 W	18	29	M 50	2 NM	27	1008.0	5.5	11.0	9	16.5	09	12	13
OCTA	A8OG	15	36.0 N	142.0 W	18	25	M 55	1 NM	80	1002.1	15.0	18.0	5	8	26	10	28
	KSRY	15	59.6 N	145.3 W	18	07	M 58	2 NM	62	0972.5	6.7	5.6	6	26			
GREAT LAND	WFDP	15	58.2 N	148.6 W	18	07	M 48	2 NM	81	0960.0	6.5	7.8	4	8	11	8	19.5
ARCO FAIRBANKS	WGWB	15	49.6 N	134.4 W	18	20	M 18	10 NM	01	0986.0	7.2	9.4	4	3	26	9	32.5
PRESIDENT TAFT	WLDT	15	53.8 N	177.8 E	18	29	40	10 NM	01	0998.9	1.1	5.6	5	8	29	7	26
	D9FE	16	38.3 N	144.3 W	00	24	M 40	5 NM	02	0998.0	10.0	13.0	13	24.5	24	13	24.5
DAFFODIL	H3AG	16	35.8 N	156.7 W	00	28	M 42	10 NM	02	1012.0	19.0	17.0	12	29.5	28	11	28
EXXON HOUSTON	KHBA	16	51.1 N	140.9 W	00	10	45	5 NM	81	0972.5	9.5	6.7	5	16.5	10	11	32.5
MILLYER BROWN	KKLA	16	45.3 N	124.7 W	00	19	35	1 NM	63	0991.0	12.2	11.2	6	14.5	27	10	24.5
ARCO FAIRBANKS	WGWB	16	50.3 N	135.8 W	00	16	M 16	10 NM	15	0982.9	7.8	8.9	4	8	27	8	26
EXXON NEW ORLEANS	WNDM	16	41.7 N	126.8 W	00	19	M 72	10 NM	02	0996.3	14.0	13.8	6	19.5	18	10	42.5
KENAI	WSNB	16	41.9 N	126.5 W	00	18	M 60	2 NM	81	0995.0	13.3	8.3	17	34.5	20	9	21
	ZCUT	16	52.4 N	154.3 W	00	25	30	2 NM	07	0971.3	5.0	5.0	5	6.5	25	8	24.5
	YCSE	16	42.6 N	127.6 W	06	23	M 55	1 NM	07	0993.6	14.0	12.0	12	19.5	18	15	18
OCTA	A8OG	16	36.0 N	137.3 W	12	29	M 32	5 NM	80	1008.5	13.0	18.1	4	10	28	10	29.5
SEALAND ENDURANCE	KGJX	16	46.2 N	158.0 W	12	30	M 40	10 NM	15	0995.4	6.1	8.0	9	18	32	15	26
MARITIME ACE	3EKN	17	37.9 N	165.0 W	00	22	M 50	2 NM	62	1007.0	13.0	11.0	6	13	21	5	14.5
SEALAND ENDURANCE	KGJX	17	46.7 N	152.1 W	00	28	M 34	5 NM	15	0996.3	6.7	8.0	9	16.5	30	15	24.5
AQUARIUS	WSKJ	17	23.2 N	124.9 E	00	36	M 40	1 NM	80	1018.5	19.0	25.0	9	24.5			
KENAI	WSNB	17	38.1 N	124.3 W	00	19	M 30	2 NM	62	1013.8	14.4	10.0	6	29.5	18	XX	19.5
	H8DE	17	44.0 N	128.3 W	18	26	M 42			1008.5	10.0	12.0	16	24.5	26	16	26
	H8DE	18	44.8 N	129.2 W	00	25	M 50			1010.0	10.5	12.0	18	31	30	18	31
SANTA JUANA	KFFJ	18	30.1 N	116.7 W	00	31	25	10 NM	02	1018.1	18.3	16.1	4	5	32	9	24.5
BAY BRIDGE	3EYN	18	45.9 N	168.0 E	02	25	M 60	< 50 YD		0996.8	9.0	7.0	9	26	19	9	26
PRESIDENT FILLMORE	KRDN	18	46.8 N	168.6 E	06	17	38	2 NM	65	0993.0	10.0	4.4	4	10	16	6	24.5
ARCO ANCHORAGE	WCIO	18	42.9 N	126.8 W	12	18	32	10 NM	03	1019.3	11.0	13.0	5	8	28	8	24.5
SAMOA	OXTZ	18	45.2 N	173.2 W	18	20	M 48	5 NM	51	1010.0	8.9	9.0	8	16.5			
PRESIDENT TAFT	WLDT	18	45.5 N	151.8 E	18	22	40	10 NM	02	0999.9	1.1	3.9	6	13	22	12	29.5
EXXON PHILADELPHIA	WNFJ	18	45.5 N	125.3 W	21	16	M 50	5 NM	02	1006.9	16.0	12.2	8	13	22	13	19.5
DAFFODIL	H3AG	19	35.3 N	138.7 W	00	09	M 55	10 NM	03	1018.6	15.5	18.0	4	6.5	09	4	5
DRAGOR MAERSK	OYYZ	19	43.5 N	128.1 W	00	24	40	2 NM	18	1012.3	13.0	15.0	12	24.5	26	12	24.5
SAMOA	OXTZ	19	45.1 N	171.3 W	00	23	M 50	1 NM	52	1005.0	10.4	8.0	9	18			
ARCO ANCHORAGE	WCIO	19	44.7 N	128.1 W	00	24	50			1007.0	8.3	10.6	8	19.5	24	8	26

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea Waves†		Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.*	Height ft.
	PACIFIC	DEC.															
SEALAND PATRIOT	KHRF	19	53.4 N	179.7 E	06	31 M	50			0971.0	1.0	3.0	10	28	31	12	34.5
PRESIDENT FILLMORE	KRDH	19	48.2 N	178.4 W	06	29	52	5 NM	02	0989.3	5.6	5.0	4	10	29	6	32.5
MOBILE MERIDIAN	KGSM	19	49.2 N	128.2 W	12	27	38	10 NM		1006.8	7.2	8.9	2	6.5	27	6	24.5
SKAUGRAN	LHUK	19	54.5 N	171.4 W	18	29 M	57	2 NM	63	0971.0	1.0						
	ZCUT	19	51.7 N	172.0 W	18	31	55	.5 NM	07	0983.8	1.0	5.0	12	29.5	23	12	36
SKAUGRAN	LHUK	20	54.2 N	171.7 W	00	26 M	67	1 NM	26	0980.0	0.0						
PRESIDENT FILLMORE	KRDH	20	48.6 N	166.3 W	05	30	45	10 NM	85	0993.5	2.8	5.6	5	8	38	10	24.5
ATIGUN PASS	KSFJ	20	13.6 N	99.4 W	12	36	32	5 NM	03	1012.9	23.9	24.4	6	10	36	10	24.5
	ZCUT	20	51.8 N	173.3 W	12	29	40	5 NM	23	0995.5	1.0	5.0	8	24.5	27	8	24.5
	H9QR	20	53.5 N	164.0 W	20	28 M	65	50 YD	58	0992.4	0.2						
HANJIN POHANG	DBQN	21	54.4 N	172.0 W	00	27 M	55	1 NM	58	0973.0	3.0	3.0	19	29.5	27	20	32.5
PRESIDENT FILLMORE	KRDH	21	48.0 N	156.0 W	00	27	42	10 NM	87	0989.8	5.6	6.1	5	10	27	9	24.5
MISSION SANTA CLARA	WKJO	21	48.4 N	132.5 W	00	14	45	5 NM	80	0983.0	8.3	8.8	6	8	16	8	24.5
	H9QR	21	53.3 N	164.7 W	02	28 M	65	1 NM		0992.4	0.3						
	BMDM	21	54.4 N	165.5 W	06	30 M	57	2 NM	60	0979.1	1.5						
DRAGOR MAERSK	OVYZ	21	52.9 N	155.1 W	18	27	33	5 NM	22	0977.5	3.3		12	26			
SEALAND FREEDOM	WGJW	21	54.1 N	163.5 W	18	30 M	48	5 NM	68	0971.4	3.5	8.0					
DRAGOR MAERSK	OVYZ	22	53.2 N	156.9 W	00	25	40			0977.5	6.0		12	26	26	12	26
	H9QR	22	51.6 N	174.8 W	20	31 M	55	1 NM	68	0992.4	0.1						
PAN WESTERN	D7SF	23	50.5 N	173.0 E	00	30 M	45	1 NM	23	0991.0	3.0	6.0	XX	16.5	30	XX	26
	D7PT	23	52.2 N	135.0 W	12	32 M	30	5 NM	02	0994.5		9.0	6	32.5	32	6	32.5
	D7PT	24	53.7 N	138.9 W	00	24 M	24			0995.0	6.0	9.0	6	24.5	29	6	24.5
	D7PT	25	54.5 N	149.9 W	00	21 M	50	10 NM	02	0999.0	5.0	5.0	5	19.5	26	5	19.5
SEALAND DEFENDER	KGJB	25	38.1 N	147.3 E	00	30 M	42	10 NM	02	1001.0	13.0	17.0	5	6.5	31	8	26
SKOUBORG	LION	25	40.0 N	174.3 E	00	28	52	5 NM	01	0987.5	12.0	12.0	10	16.5	27	14	19.5
AMERICAN ASTRONAUT	WZJG	25	36.5 N	125.6 W	00	03	14	> 25 NM	02	1030.0	13.5	14.4	5	5	31	7	32.5
ROSE	6ZCJ	25	39.6 N	179.4 E	12	27 M	49	1 NM		0988.5	7.5	13.5					
ARCO ANCHORAGE	WCIO	25	52.2 N	132.5 W	12	28	55				5.0	5.0	8	19.5	18	8	19.5
PRESIDENT CLEVELAND	KGXA	25	50.0 N	129.0 W	18	24	30	10 NM	02	1016.0	11.9	8.9	8	24.5	27	10	16.5
ROSE	6ZCJ	26	40.8 N	177.7 W	00	27 M	48	5 NM		0996.5	9.8	12.0					
SEALAND DEFENDER	KGJB	27	40.6 N	161.4 W	20	35 M	52	5 NM		0983.0	10.0	13.0	5	10	35	7	24.5
SEALAND DEFENDER	KGJB	28	40.6 N	159.8 W	00	15 M	55	5 NM		0972.3	13.0	13.0	5	8	13	5	10
PRESIDENT MADISON	WCIP	28	44.4 N	158.3 W	06	13	45	5 NM	02	0977.5	8.9	6.7	11	16.5	XX	13	24.5
ANNA MAERSK	OVKS	28	37.6 N	167.3 W	12	33	20	10 NM	89	1007.0	12.2				32	12	24.5
	KSRY	28	10.6 N	87.4 W	14	05 M	50	5 NM	02	1012.6	27.8	27.0	4	13	08	5	16.5
AMERICAN APOLLO	KEOD	28	48.3 N	166.1 E	18	27	25	5 NM	25	1003.5	8.9	13.9	8	24.5	29	9	24.5
	DSMC	29	53.6 N	151.1 W	06	16 M	34	1 NM	04	1006.0	6.0	6.0	8	37.5	14	9	24.5
YOUNG SEAGULL	6ZDN	30	45.3 N	176.2 W	00	09 M	50	2 NM	21	0986.0	4.8	5.5	6	6.5	33	8	16.5
	DSMC	30	53.9 N	155.6 W	00	20 M	24	5 NM	01	1009.0	4.0	5.0	12	24.5	20	10	16.5
PRESIDENT CLEVELAND	KGXA	31	51.0 N	162.5 E	18	14	58	5 NM	03	1010.7	7.0	2.8	2	13	14	8	16.5
	OXDW	31	49.7 N	159.7 E	18	13	58	2 NM	84	0992.5	2.8						

+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

THE MARINERS WEATHER LOG WELCOMES ARTICLES AND LETTERS FROM MARINERS RELATING TO METEOROLOGY AND OCEANOGRAPHY, INCLUDING THEIR EFFECTS ON SHIP OPERATIONS.

U.S. Cooperative Ship Weather Reports

October, November and December 1982

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS OCTOBER, NOVEMBER, DECEMBER, 1982

SHIP NAME	VIA RADIO	VIA MAIL
ACACIA WLB406		10
ADRIAN MAERSK	45	69
ALASKA STANDARD	11	11
ALEUTIAN DEVELOPER	19	28
ALMERIA LYKES	31	70
AMERICAN ACE	85	144
AMERICAN ARCHER	69	81
AMERICAN EXPLORER	23	6
AMERICAN LANCER	56	129
AMERICAN LEGEND	12	23
AMERICAN MARKETER	14	138
AMOCO CAIRO	17	
AQUARIUS	45	63
ARCO FAIRBANKS	66	99
ARECIBO	142	207
ARTHUR M ANDERSON	1	104
ASIA INDUSTRY	7	17
ATLANTIC PIONEER	8	
AUSTRAL PIONEER	39	156
AZTECA	30	
BALAO	52	
BARBER PRIAM	62	157
BARBER TONSBERG	49	55
BAY	28	
BEN FRANKLIN	1	
BLUE OCEAN	32	263
BORINQUEN	68	167
BUILDER	31	129
CALIFORNIA RAINBOW	39	130
CHAPMAN	17	
CHARLOTTE MAERSK	131	
CHERRY VALLEY	42	43
CHEVRON BURNABY	74	42
CHEVRON HAWAII	33	90
CHEVRON OREGON	2	
CHRISTIAN MAERSK	28	26
CLARA MAERSK	56	227
COLUMBUS AMERICA	68	
CONFIDENCE WMEC 619	2	
COURAGEOUS WMEC 622	12	
CYGNUS	101	87
DANA AMERICA	5	
DEL RIO	8	
DELAWARE II	87	132
DELTA SUD	47	60
DOCTOR LYKES	67	133
DRUCILLA U	8	
EASTERN DIAMOND	2	177
EASTERN WORLD	8	33
ENNA G	9	128
EVER SPRING	33	
EXPORT COMMERCE		19
EXXON BANGOR	13	41
EXXON HOUSTON	56	58
EXXON NEW ORLEANS	34	66
EXXON SAN FRANCISCO	10	101
FEDTRADE	1	
FREDERICK LYKES	35	40
GALVESTON	53	117
GENEVIEVE LYKES	12	149
GEORGE M KELLER	42	101
GLOBAL FRONTIER	11	7
GOLDEN RAY	2	
GREEN FOREST	12	20
GULF BANKER	4	35
H J HAYNES		102
HARDANGER	11	39
HILLYER BROWN	3	11
HOEGH MERCHANT	24	
HOTAKA MARU	135	53
IGUAZU	30	78
IRONWOOD WLB 297	7	
J R GREY		51
JAPAN ACE	169	86
JARVIS WMEC 725	38	
JOHN LYKES	23	
KAUAI	54	207
KEYSTONER	117	135
KOREAN FIR	23	21
LAKE TAHOE	33	85
LAVAUX	18	
LION OF CALIFORNIA	15	37
LUCIA DEL MAR	3	5
MALLORY LYKES	57	126
MANUKAI	41	184
MARDI GRAS	25	13
MARJORIE LYKES	27	87
MAUMEE	45	20
MELVILLE	157	194
METEOR T-AKR 9	10	
MING GLORY	35	35
MOBIL AERO	7	56
MOBILFUEL	8	141
MORANT	34	
MORMACSEA	15	20
MORMACTIDE	23	
MT MITCHELL	30	90
NANCY LYKES	12	
NEWARK	14	48
NORTH STAR III		6
NURA DEL MAR	8	
OCTA	25	121
ORCO MINER	24	
ORIENTAL TAIO	38	214
OVERSEAS MARILYN	56	197
PACBARONESS	20	8
PACGLORY	49	
PACIFIC SAGA	21	84
PACMERCHANT	12	10
PAN DYNASTY	4	
PARALLA	46	65
PHILADELPHIA	92	112
POLAR ALASKA		189
PONCE	13	59
PRESIDENT FILLMORE	58	99
PRESIDENT JACKSON	25	38
ACADIA	25	42
AFRICAN DAWN	22	29
ALBATROSS IV	57	89
ALLISON LYKES	23	74
AMARANTE	27	3
AMERICAN ALLIANCE	57	57
AMERICAN ARGOSY	63	130
AMERICAN HERITAGE	20	17
AMERICAN LARK	112	202
AMERICAN LEGION	67	176
AMERICAN MERCHANT	88	233
ANJA LEONHARDT	10	
ARCO ALASKA	40	40
ARCO PRUDHOE BAY	54	24
ARGONAUT	24	
ASHLEY LYKES	7	
ASIA MORALITY	22	
ATLANTIC RAINBOW	12	
AUSTRAL PURITAN	80	82
B T ALASKA	19	183
BALD BUTTE	34	148
BARBER TAIF	29	
BARBER TSU	6	17
BAY BRIDGE	35	111
BENJAMIN F FAIRLESS	4	
BOGASARI DUA	17	65
BOSTON	57	103
BUNGA CHEMPAKA	26	
CAPRICORN	24	64
CHARLES LYKES	68	186
CHASE WMEC 718	2	
CHEVRON ANTWERP	3	
CHEVRON CALIFORNIA	53	105
CHEVRON LOUISIANA	1	
CHEVRON WASHINGTON	32	56
CHRISTOPHER LYKES	1	33
CLIFFORD MAERSK	75	231
COLUMBUS LOUISANA	68	
CONTRACT TRADER	2	
COVADONGA		34
D L BOWER		188
DAVID D. IRWIN	1	9
DEL SOL	22	57
DELTA BRASIL	5	
DEPENDABLE WMEC 626	3	
DOLLY TURMAN	2	50
DUANE	98	90
EASTERN FRIENDSHIP	34	16
EDGAR M QUEENY	55	78
ESSO BANGKOK	15	
EVER VALUE	2	41
EXPORT FREEDOM	37	132
EXXON BATON ROUGE	10	16
EXXON HUNTINGTON	16	24
EXXON NEWARK	3	24
EXXON WASHINGTON	21	37
FIREBUSH WLB 393	9	5
FRIENDSHIP	118	
GARDENIA	23	57
GEORGE A SLOAN	73	23
GERONIMO		37
GLOMAR CHALLENGER	109	114
GREAT LAND	44	46
GREEN KOBE	10	8
GULF MERCHANT		1
HAMILTON WMEC 715	50	47
HELLESPONT GLORY	102	173
HOEGH CAIRN	28	40
HOEGH MIRANDA	17	37
HOWARD W BELL	7	24
IMACHUS STAR	48	
ITALICA	29	51
JACKSONVILLE	12	
JAPAN AMUROSE	60	30
JEAN LYKES		73
JOSEPH H. THOMPSON		12
KEIYO	14	108
KNORR	28	51
KOREAN JUPITER	51	21
LASH ATLANTICO	35	130
LESLIE LYKES	21	
LNG LOUISIANA	11	39
LURLINE	42	140
MALLOW WLB 396	23	
MANULANI	33	130
MARIA TOPIC	62	
MASON LYKES	80	102
MAYA	5	
MELVIN H. BAKER	115	
MIDGETT WMEC 726	78	116
MING MOON	1	39
MOBIL ARCTIC	64	236
MOBILGAS	31	130
MORMACALTAIR	36	112
MORMACSKY	5	47
MORMACVEGA	11	31
MUNRO WMEC 724	7	
NAVASOTA	6	
NORDHVAL	1	
NORTHERN LIGHT	24	86
OAKLAND	9	39
OGDEN THAMES		28
ORCO TRADER	41	78
OVERSEAS ARCTIC	49	161
OVERSEAS NEW YORK	1	36
PACDUCHESS	28	
PACIFIC ACE	42	63
PACIFIC VENTURE	90	185
PACMONARCH	37	17
PAN PACIFIC	1	
PEIRCE	4	9
PHILIP R CLARKE		88
POLAR SEA	117	243
PORTLAND	71	70
PRESIDENT GARCIA	2	46
PRESIDENT JEFFERSON	58	111
ACONCAGUA	5	33
AGUADILLA	90	64
ALBERT MAERSK	22	20
ALLTRANS ENTERPRISE	12	52
AMERICA SUN	61	127
AMERICAN APOLLO	67	213
AMERICAN ARROW	61	
AMERICAN HIGHWAY	18	
AMERICAN LEADER	46	136
AMERICAN LIBERTY	14	149
AMERICAN TRADER	54	191
AMNA MAERSK	37	115
ARCO ANCHORAGE	4	31
ARCO SAG RIVER	2	7
ARIES	14	31
ASIA BRAVERY	1	96
ASIAN EXPRESS	28	
AUSTRAL ENTENTE	9	8
AXEL JOHNSON	13	35
B T SAN DIEGO	29	156
BALTIMORE	3	6
BARBER TERRIER	38	47
BARRANCA	72	93
BAYAMON	45	67
BERNINA		77
BOHEME	24	9
BOUTWELL WMEC 719	20	18
BUNGA MELAWIS	119	45
CARNIVALE	4	
CHARLESTON	30	50
CHASTINE MAERSK	7	
CHEVRON ARIZONA	31	151
CHEVRON COLORADO	6	4
CHEVRON MISSISSIPPI	33	75
CHIBA	64	
CHUEN ON	28	39
CLOVER WLB 392	41	24
CONCORDIA SUN	4	11
COPIAPO		10
CRYSTAL REED	28	
DAFFODIL	25	139
DAVID PACKARD		121
DEL VALLE	20	56
DELTA CARIBE	25	46
DIANA	17	22
DON JUAN	45	77
DUBHE	1	
EASTERN PACIFIC	19	26
EDWARD RUTLEDGE	29	4
ESSO EVERETT	12	
EXPORT CHALLENGER	7	
EXPORT PATRIOT	31	84
EXXON BOSTON	77	78
EXXON JAMESTOWN	15	24
EXXON NORTH SLOPE	48	13
FAIRWEATHER	49	33
FORTALEZA	54	92
GALLATIN WMEC 721	4	6
GAS LIBRA	7	137
GEORGE A STINSON		70
GLACIER WAGB 4	120	
GOLDEN DAISY		54
GREAT OCEAN	72	56
GREEN STAR	43	50
GULF SHIPPER	19	123
HANJIN POHANG	1	2
HESS VOYAGER	12	30
HOEGH CLIPPER	24	32
HONSHU ARROW	5	60
HOWELL LYKES	23	
INGER	80	174
ITAPUCA	1	
JADRAN	14	
JAPAN APOLLO	77	63
JOHN DYKSTRA	2	73
JOSEPH LYKES	4	
KENAI	1	78
KOFUKU MARU	36	124
KOREAN PRIDE	22	11
LASH PACIFICO	27	73
LETITIA LYKES	10	30
LONG BEACH	5	
M P GRACE	4	
MANISTEE	31	
MARCONA CONVEYOR	13	68
MARINE CHEMICAL TRANSP	21	
MATHILDE MAERSK	9	
MAYAGUEZ	62	152
MENINA ALICE	16	
MILLER FREEMAN	34	
MING STAR	13	
MOBIL LUBE	8	75
MOBILOIL	21	65
MORMACDRACO	18	16
MORMACSTAR	39	71
MORMACWAVE	48	68
MYRON C. TAYLOR	66	75
NEPTUNE CRYSTAL	89	
NORDIC PRINCE	69	17
NORTHWIND WAGB 282	9	5
OCEAN LOG	26	
OLEANDER	88	
ORIENTAL EXECUTIVE	33	31
OVERSEAS CHICAGO	16	131
OVERSEAS OHIO	26	
PACDUKE	9	
PACIFIC ARROW	147	102
PACLADY	20	20
PACNOBLE	33	30
PAN WESTERN	14	
PENNSYLVANIA SUN	9	1
PINK SKY	8	
POLAR STAR WAGB-10	114	-
PRESIDENT ADAMS	27	27
PRESIDENT GRANT	47	125
PRESIDENT JOHNSON	62	240
ADM WM M CALLAGHAN	58	58
AIMEE LYKES	2	
ALERT	4	
ALLTRANS EXPRESS	25	20
AMERICAN ACCORD	18	70
AMERICAN AQUARIUS	58	118
AMERICAN ASTRONAUT	29	191
AMERICAN INDEPENDENCE	41	118
AMERICAN LEGACY	81	196
AMERICAN LYNX	44	210
AMERICANA	45	93
ANNIE JOHNSON	20	73
ARCO CALIFORNIA	8	
ARCTIC TOKYO		305
ARILD MAERSK	10	
ASIA HERON	48	117
ATIGUN PASS	60	248
AUSTRAL ENVOY	35	89
AXEL MAERSK	17	
BACAB	18	
BALTIMORE TRADER	25	162
BARBER TOBA	20	39
BASSWOOD WLB388	18	15
BAYANO	99	58
BIBB WMEC 31	52	
BONITA	2	27
BROOKS RANGE	10	46
BURNS HARBOR		177
CHALLENGER		99
CHARLOTTE LYKES	5	79
CHEMICAL VENTURE	85	
CHEVRON BRUSSELS		127
CHEVRON COPENHAGEN	22	148
CHEVRON NORTH AMERICA		38
CHILULA WMEC-153	1	73
CITRUS WLB300	26	
COLUMBIA	93	
CONDATA		18
CORNUCOPIA	49	73
CRYSTAL STAR	46	31
DALLAS WMEC 716	67	97
DEL ORO	10	
DEL VIENTO	6	13
DELTA NORTE		31
DISCOVERER OSS	66	98
DRAGOR MAERSK	31	52
DURABLE	4	
EASTERN VENTURE	11	14
ELIZABETH LYKES	15	44
ESSO PALM BEACH	12	130
EXPORT CHAMPION	6	17
EXXON BALTIMORE	32	37
EXXON GETTYSBURG	7	19
EXXON LEXINGTON	21	33
EXXON PHILADELPHIA	6	34
FALSTRIA	65	132
FRANCIS SINCERE NO 6	24	
GALLEON TOURMALINE	26	25
GEMINI	4	
GEORGE M HUMPHREY	12	50
GLACIER BAY	84	172
GOLDEN GATE	4	36
GREEN AUKLET	78	36
GUADALUPE I	7	42
GULFPRINCE	1	
HARBOUR BRIDGE	43	230
HIKAWA MARU	97	34
HOESH MARLIN	6	
HOWLING BREEZE	38	149
HUDSON T-AO 184	47	57
INGHAM WMEC 35	1	6
J LOUIS	42	149
JAMES LYKES	6	13
JAPAN CAOBO	34	77
JOHN B MUNSON		83
KANE T-AGS 27	39	7
KENNETH E HILL	8	90
KOREAN COMMANDER	21	55
LAKE CHARLES	47	112
LAUREL WLB2901	6	
LILLOOET	42	76
LOUISE LYKES	31	
MAIN EXPRESS	66	177
MANUANILI	21	75
MARCONA EXPORTER	79	174
MARITIME ACE	49	23
MAUI	51	202
MAYON	5	18
MCONIA	54	126
MING GALAXY	21	44
MISSION SANTA CLARA	22	61
MOBILE MERIDIAN	66	162
MONTPELIER VICTORY	1	
MORMACSAGA	8	54
MORMACSUN	11	54
MOSMAN STAR	1	
NAGARA	60	61
NEW JERSEY SUN	17	80
NORSE PILOT	8	
NORWAY	67	
OCEANIC	151	225
OLGA TOPIC	4	
ORIENTAL SOVEREIGN	38	34
OVERSEAS JUNEAU	28	16
PACBARON	24	
PACEMPEROR	19	
PACIFIC ERA	61	56
PACMAJESTY	15	23
PACSTAR	24	
PANAMA	43	40
PERENNIAL ACE	1	
POINT SWIFT WP802312	1	
POLYNESIA	124	203
PRESIDENT CLEVELAND	29	54
PRESIDENT HOOVER	65	136
PRESIDENT KENNEDY	74	65

Continued on page 117

U.S. NDBC Climatological Data

October, November and December 1982

OCTOBER 1982			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.3W	744	31	25.5	04 19	14.9	17 15	21.5	744	31	26.6	05 20	22.9	28 03	24.4	744	31	00.1	14 07	-09.7	17 18	-02.9
41002	32.3N	075.3W	744	31	26.1	08 21	17.4	17 19	23.2	744	31	27.3	01 15	23.3	29 10	25.3	744	31	00.3	05 21	-07.9	17 19	-02.1
41006	29.3N	077.3W	743	31	27.8	14 19	18.5	17 13	25.2	743	31	28.7	09 18	25.2	30 10	27.2	743	31	00.3	14 19	-08.4	17 13	-02.0
42001	25.9N	089.7W	743	31	29.1	09 23	20.7	22 08	26.4	744	31	29.1	03 19	24.6	29 19	27.0	744	31	01.7	31 13	-05.1	22 08	-00.6
42002	26.0N	093.5W	744	31	29.9	02 17	22.7	24 12	26.9	744	31	30.5	03 20	27.6	29 12	28.9	744	31	00.4	06 16	-05.7	22 08	-02.0
42003	26.0N	086.0W	743	31	30.6	09 19	21.6	26 08	26.2	744	31	29.6	09 19	27.6	29 12	28.6	744	31	01.0	09 19	-06.7	23 00	-02.3
42007	30.1N	088.9W	744	31	28.9	11 22	14.1	24 15	22.8	744	31	28.9	09 20	21.5	31 09	24.7	744	31	01.7	29 07	-08.9	23 14	-02.0
44003	40.8N	068.5W	744	31	17.3	08 20	08.5	24 02	13.3	744	31	16.0	01 15	12.6	27 10	14.0	744	31	03.3	14 16	-05.2	24 02	-00.7
44004	39.0N	070.0W	732	31	24.0	01 15	10.5	17 11	17.6	732	31	25.1	01 17	19.6	28 12	22.1	736	31	00.0	26 03	-11.3	17 11	-04.5
44005	42.7N	068.3W	474	21	17.4	02 04	06.8	24 21	12.5	175	08	12.0	29 19	11.4	25 03	11.6	175	08	02.4	31 03	-04.8	24 17	-00.3
44007	43.5N	070.1W	736	31	19.5	02 00	04.3	10 11	10.7	721	31	15.5	06 19	11.1	23 13	12.8	741	31	04.6	02 00	-08.3	10 11	-02.1
44008	40.5N	069.4W	730	31	18.6	02 04	07.7	24 02	13.1	732	31	17.7	01 19	12.2	23 01	13.8	730	31	05.2	21 06	-04.9	17 16	-00.7
45001	48.0N	087.6W	741	31	10.6	03 03	00.0	20 23	06.8	744	31	08.3	05 21	04.8	23 09	06.4	744	31	03.6	14 23	-05.0	20 12	00.3
45002	45.3N	086.3W	743	31	17.6	07 07	02.5	21 02	10.9	744	31	14.9	01 02	09.9	29 21	12.1	744	31	03.8	29 04	-08.1	21 02	-01.2
45003	45.3N	082.8W	743	31	16.0	07 13	01.5	22 10	10.3	737	31	13.7	04 20	08.2	30 19	11.1	743	31	03.3	01 01	-08.0	22 10	-00.8
45004	47.2N	086.5W	740	31	11.6	18 21	00.4	21 02	07.5	740	31	09.2	14 05	05.9	22 10	07.4	744	31	03.9	29 07	-05.9	20 21	00.1
45005	41.7N	082.5W	744	31	22.3	01 21	05.3	23 12	13.8	744	31	19.5	01 21	12.6	31 04	15.8	744	31	03.0	28 19	-09.3	16 13	-02.1
45006	47.3N	090.0W	743	31	14.1	05 01	00.5	20 15	08.4	744	31	11.3	01 20	07.3	25 14	08.8	744	31	04.0	14 22	-07.6	20 15	-00.4
45007	42.7N	087.1W	743	31	19.7	07 00	04.1	21 10	12.2	744	31	16.3	03 20	07.7	23 02	12.3	744	31	05.2	28 23	-06.3	16 17	-00.1
45008	44.3N	082.4W	743	31	18.1	07 02	03.9	21 18	11.8	743	31	16.4	04 19	08.8	21 06	13.1	743	31	03.5	30 20	-08.3	17 06	-01.4
46001	56.0N	148.0W	744	31	10.9	01 18	01.2	27 07	07.0	744	31	11.2	01 22	07.3	28 21	09.2	744	31	00.8	12 14	-06.6	27 07	-02.2
46002	42.5N	130.0W	742	31	16.9	21 09	12.0	26 07	15.1	744	31	16.9	01 01	15.0	30 14	16.1	744	31	01.0	23 19	-03.5	25 19	-01.0
46003	52.0N	156.0W	738	31	10.3	11 23	00.4	23 01	07.0	743	31	10.9	04 01	08.0	30 16	09.2	743	31	00.5	11 23	-07.8	23 01	-02.3
46004	51.0N	136.0W	743	31	14.1	09 05	07.1	21 18	10.7	743	31	14.0	01 01	10.2	31 13	11.7	743	31	01.9	09 05	-04.2	21 18	-01.1
46005	46.0N	131.0W	724	31	15.7	08 11	08.6	26 03	13.3	726	31	17.2	05 01	14.5	29 09	15.9	726	31	-00.3	21 15	-06.5	26 03	-02.6
46006	40.7N	137.7W	720	31	22.2	11 00	13.5	25 09	19.4	744	31	17.8	15 23	14.7	30 04	16.5	723	31	06.3	28 05	-02.2	25 09	02.9
46010	46.2N	124.2W	732	31	20.1	11 00	07.7	18 14	13.0	736	31	15.0	01 01	12.3	01 16	13.2	739	31	06.3	11 00	-05.0	18 13	-00.2
46011	34.9N	120.9W	742	31	21.9	23 18	12.5	12 14	15.7	742	31	19.1	24 22	14.2	09 10	16.4	743	31	05.2	23 18	-04.2	16 18	-00.6
46012	37.4N	122.7W	741	31	18.8	10 00	10.8	13 06	14.5	743	31	16.1	23 23	13.6	08 09	14.6	744	31	04.4	09 20	-03.6	13 06	-00.1
46013	38.2N	123.3W	742	31	17.4	10 19	10.1	01 14	13.9	737	31	15.4	23 23	11.3	05 01	13.4	744	31	05.1	10 19	-02.6	13 11	00.4
46014	39.2N	124.0W	742	31	18.3	23 04	10.4	12 17	14.4	743	31	17.7	02 01	12.3	15 13	15.0	743	31	04.3	21 23	-04.2	02 10	-00.6
46016	63.3N	170.3W	094	18	03.4	18 18	00.1	04 21	01.5														
46017	60.3N	172.3W	173	26	05.8	15 18	00.1	05 06	02.5														
46018	60.3N	177.0W	230	30	06.0	17 21	00.1	29 17	03.1														
46019	57.2N	170.3W	242	31	07.6	16 00	00.4	23 18	03.8														
46020	55.9N	168.0W	233	31	08.1	02 03	01.9	23 15	04.9	247	31	08.2	01 21	06.0	31 09	06.9	248	31	01.1	15 15	-05.1	07 18	-01.9
46021	57.7N	160.0W	200	30	07.9	16 03	00.1	26 17	04.0														
46022	40.8N	124.5W	741	31	18.2	22 07	09.8	06 07	13.7	741	31	16.1	25 19	11.4	07 09	13.5	742	31	04.2	12 00	-03.9	27 15	00.2
46023	34.3N	120.7W	744	31	21.9	10 13	13.9	15 15	16.7	744	31	18.6	25 06	15.0	05 17	16.9	744	31	04.8	10 13	-03.0	13 13	-00.2
46024	33.0N	119.2W	739	31	24.0	11 22	16.0	04 01	18.2	739	31	21.8	11 23	18.0	01 06	18.9	739	31	02.5	11 22	-02.6	19 07	-00.7
46025	33.8N	119.3W	742	31	23.0	09 09	14.3	30 22	19.0	742	31	20.3	09 21	17.2	02 07	18.8	742	31	03.9	09 09	-03.8	30 22	00.2
46026	37.8N	122.7W	741	31	22.7	10 21	10.2	12 14	14.0	741	31	15.6	23 22	12.2	09 04	14.1	741	31	08.1	10 21	-03.8	13 03	-00.1

OCTOBER 1982			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.7N	072.3W	744	31	1030.2	19 13	1005.4	16 08	1017.8	736	46	25 01	070	15.1	16.6	11.0	10.9	17.3	19.5	15.7	16.3	15.3
41002	32.3N	075.3W	744	31	1027.5	18 16	1002.6	24 23	1017.3	740	32	24 09	050	13.3	12.3	10.3	8.5	15.7	18.8	14.6	11.6	12.6
41006	29.3N	077.3W	743	31	1024.0	18 16	1006.3	24 09	1016.9	736	24	24 14	320	9.1	12.3	11.6	9.0	9.3	11.5	9.9	10.5	11.2
42001	25.9N	089.7W	744	31	1024.6	26 16	1008.2	02 22	1016.3	730	23	25 06	060	13.9	12.3	10.5	11.7	7.6	6.3	9.5	7.6	11.7
42002	26.0N	093.5W	744	31	1024.4	26 16	1007.8	02 22	1016.0	711	27	22 19	030	13.7	13.3	10.2	13.4	15.5	13.4	6.6	6.2	12.5
42003	26.0N	086.0W	744	31	1023.8	26 15	1007.7	02 22	1015.6	736	25	24 05	010	12.6	10.8	11.6	8.3	8.1	3.6		11.4	11.0
42007	30.1N	088.9W	744	31	1027.3	26 15	1010.2	03 10	1017.9	734	23	23 02	030	12.4	12.1	10.6	8.8	7.7	7.8	9.8	9.6	10.8
44003	40.8N	068.5W	744	31	1032.8	19 16	998.2	14 17	1018.2	724	35	10 00	060	10.8	15.5	12.5	6.5	4.9	6.8	9.4	11.0	10.4
44004	39.0N	070.0W	733	31	1033.0	19 16	1001.4	16 11	1018.4	732	33	10 02	360	14.2	13.9	13.8	8.3	8.3	7.9	11.4	15.0	12.3
44005	42.7N	068.3W	474	21	1033.9	24 17	1003.5	02 02	1019.9	474	37	09 18	070	12.6	18.2	12.2	11.7	7.4	11.8	9.0	15.1	13.5
44007	43.5N	070.1W	736	31	1035.6	24 16	995.3	15 18	1019.5	728	23	02 03	340	10.4	12.9	9.9	5.3	8.6	10.1	9.1	11.5	10.2
44008	40.5N	069.4W	732	31	1032.9	19 15	999.2	09 22	1018.6	729	34	09 23	040	10.9	17.2	10.2	6.5	7.1	7.8	10.1	10.5	10.9
45001	48.0N	087.6W	744	31	1030.4	22 00	995.2	14 21	1015.0	728	27	20 17	360	11.2	14.8	12.5	11.6	11.3	12.4	9.9	13.3	12.0
45002	45.3N	086.3W	744	31	1032.4	23 17	996.6	20 12	1016.5	743	27	20 20	320	11.2	8.5	8.9	10.8	10.6	12.4	10.4	11.5	11.3
45003	45.3N	082.8W	743	31	1032.6	24 14	996.2	15 05	1017.3	730	28	21 04	280	8.6	6.8	12.1	11.9	10.7	11.2	9.5	12.9	11.0
45004	47.2N	086.5W	740	31	1030.1	22 15	996.2	14 23	1015.4	733	27	20 21	360	12.2	12.3	11.0	10.0	9.4	10.6	8.8	10.4	10.3
45005	41.7N	082.5W	744	31	1034.6	24 14	1002.5	15 10	1019.8	725	31	20 19	260	8.6	8.7	9.5	8.7	9.1	10.1	13.3	10.5	10.4
45006	47.3N	090.0W	744	31	1030.1	21 17	994.2	29 12	1014.7	723	25	06 17	060	12.9	14.9	11.0	8.5	7.9	10.2	12.2	9.8	10.9
45007	42.7N	087.1W	743	31	1033.8	24 15	1000.8	20 08	1017.7	742	29	20 09	240	11.8	9.0	10.3	9.4	11.6	11.2	13.9	9.7	11.2
45008	44.3N	082.4W	743	31	1033.9	24 16	998.0	15 06	1018.0	737	29	21 03	270	10.5	7.2	9.8	11.6	11.9	12.2	12.3	13.8	11.9
46001	56.0N	148.0W	743	31	1031.8	19 07	975.5	22 20	1004.7	740	32	11 14	110	17.1	12.4	11.4	16.3	13.7	16.6	15.6	18.3	16.5
46002	42.5N	130.0W	744	31	1030.1	09 07	987.5	22 04	1016.5	742	29	22 11	290	14.3	14.6	11.3	13.2	16.3	16.3	15.2	14.1	14.9
46003	52.0N	156.0W	743	31	1038.0	15 12	983.3	12 07	1013.5	740	42	04 15	040	24.4	23.7	19.0	17.6	19.4	21.2	17.6	20.8	21.0
46004	51.0N	136.0W	742	31	1031.4	19 03	967.5	23 10	1012.3	740	45	23 11	230	17.4	12.7	7.3	18.8	22.0	19.6	17.1	17.1	18.1
46005	46.0N	131.0W	725	31	1030.3	09 19	982.4	25 23	1014.3	722	43	26 03	290	15.3	12.7	9.3	12.8	13.1	16.7	17.8	16.8	15.7
46006	40.7N	137.7W	744	31	1030.0	08 18	994.3	21 19	1017.6	740	35	18 21	120	16.0	15.4	16.5	20.2	14.9	18.1	16.1	17.9	16.8
46010	46.2N	124.2W	737	31	1031.0	09 18	996.2	06 14	1016.6	735	32	22 13	180	10.2	8.7	13.9	10.5	16.0	12.8	10.2	8.8	13.0
46011	34.9N	120.9W	742	31	1024.1	27 18	1008.4	30 15	1016.1	729	28	27 01	320	8.3	4.0	4.1	4.3	8.6	4.9	7.3	13.1	10.3
46012	37.4N	122.7W	743	31	1027.1	27 19	1006.4	30 15	1017.9	680	26	08 04	340	8.9	5.6	3.5	9.2	10.0	6.8	6.9	9.2	08.9
46013	38.2N	123.3W	744	31	1027.8	27 18	1006.2	30 11	1018.3	712	24	07 22	320	6.0	7.0	6.1	9.3	9.9	6.0	6.8	11.7	09.9
46014	39.2N	124.0W	743	31	1028.0	27 18	1005.7	30 03	1017.7	713	31	22 08	170	10.0	4.4	4.0	6.8	15.8	6.7	5.0	13.7	11.0
46016	63.3N	170.3W	243	31	1033.3	22 06	988.9	16 12	1012.6	240	33	17 00	310	12.0	12.5	14.5	12.8	6.1	19.5	18.1	16.7	13.9
46017	60.3N	172.3W	233	31	1038.8	20 09	985.1	16 03	1013.1	228	33	18 15	210	3.6	11.6	12.7	11.8	14.6	16.7	14.8	11.8	13.0
46018	60.3N	177.0W	247	31	1039.1	20 12	989.0	28 09	1013.4	244	39	16 06	320	12.9	14.1	14.2	13.2	18.8	13.6	19.8	16.9	15.1
46019	57.2N	170.3W	244	31	1045.1	20 09	988.7	28 06	1015.0	243	34	13 12	150	14.1	12.7	13.3	15.1	12.0	16.6	12.8	16.0	14.4
46020	55.9N	168.0W	247	31	1043.9	20 09	991.2	31 15	1014.5	247	31	28 09	250	15.9	13.2	16.2	23.3	18.7	18.3	16.0	16.4	16.5
46021	57.7N	160.0W	235	31	1036.5	18 12	992.3	31 21	1012.4	238	36	22 17	330	14.2	16.1	11.8	14.1	12.6	17.6	17.0	19.0	16.7
46022	40.8N	124.5W	741	31	1027.8	27 19	1005.1	25 21	1017.5	696	33	22 08	170	10.9	3.9	3.2	7.0	15.7	8.5	4.4	4.4	09.8
46023	34.3N	120.7W	744	31	1022.4	27 19	1009.3	30 14	1015.7	736	26	07 23	330	13.9	5.4	8.2	5.3	7.3	6.9	6.1	13.5	12.9
46024	33.0N	119.2W	739	31	1020.8	27 18	1009.1	05 12	1014.9	730	29	27 05	330	9.5	6.5	6.5		1.0	9.5	6.3	12.5	11.5
46025	33.8N	119.3W	742	31	1021.4	27 18	1009.6	05 02	1015.2	725	24	24 13	290	5.0	4.9	4.4	5.0	2.4	3.0	7.3	7.3	06.3
46026	37.8N	122.7W	741	31	1027.4	27 19	1006.4	30 13	1018.0	695	23	30 08	160	4.1	5.3	5.3	7.2	8.5	6.0	6.5	9.8	08.2

OCTOBER 1982			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.7N	072.3W	742	9.5	25 02	2.3		44.2	25.3	13.4	10.5	3.0	1.3	
41002	32.3N	075.3W	737	7.0	24 13	2.2		43.9	30.9	10.9	11.3	2.7		
41006	29.3N	077.3W	737	5.5	24 22	1.9	1.0	51.1	33.3	9.4	4.8			
42001	25.9N	089.7W	743	2.5	06 07	1.1	20.8	68.3	10.7					
42002	26.0N	093.5W	744	2.5	06 18	1.2	13.3	71.9	14.7					
42003	26.0N	086.0W	679	3.0	24 10	1.1	23.5	67.7	8.1	0.5				
44003	40.8N	068.5W	736	7.0	10 06	2.0	12.9	40.4	21.0	11.2	12.0	2.1		
44004	39.0N	070.0W	706	7.5	10 07	2.2	14.4	38.2	16.7	9.2	16.1	5.2		
44005	42.7N	068.3W	473	6.0	10 01	1.7	26.4	42.2	7.3	12.6	10.7	0.4		
44007	43.5N	070.1W	275	2.0	26 16	0.8	57.0	36.0	6.9					
44008	40.5N	069.4W	710	7.0	10 04	1.7	19.0	42.5	18.4	9.8	9.4	0.7		
45001	48.0N	087.6W	152	3.0	07 06	1.4	12.5	59.2	25.0	3.2				
45002	45.3N	086.3W	744	4.0	20 16	1.2	34.9	42.2	18.9	3.3	0.5			
45003	45.3N	082.8W	741	4.0	21 05	1.0	40.8	43.4	11.0	4.3	0.2			
45004	47.2N	086.5W	739	5.0	20 21	1.0	44.2	41.6	9.6	2.8	1.6			
45005	41.7N	082.5W	741	2.5	20 18	0.7	60.0	35.6	4.3					
45006	47.3N	090.0W	739	3.5	06 15	1.0	42.7	38.9	13.3	4.8				
45007	42.7N	087.1W	743	4.0	20 12	1.0	44.1	41.7	11.5	2.1	0.4			
45008	44.3N	082.4W	742	4.0	21 03	1.1	34.0	47.1	15.2	3.2	0.2			
46001	56.0N	148.0W	741	7.0	24 06	3.2		6.8	34.2	29.0	24.4	5.3		
46002	42.5N	130.0W	210	6.0	06 13	2.6		34.2	21.9	24.2	17.1	2.3		
46003	52.0N	156.0W	742	8.5	22 21	3.1		15.3	32.3	21.5	24.9	4.7	1.0	
46004	51.0N	136.0W	736	9.0	05 20	3.1		11.6	35.7	30.4	16.0	4.3	1.7	
46005	46.0N	131.0W	716	7.5	26 08	2.8		23.3	33.6	22.2	16.8	3.9		
46006	40.7N	137.7W	744	6.0	06 09	2.9		18.0	36.4	18.2	26.8	0.4		
46010	46.2N	124.2W	721	7.5	22 14	2.3	1.1	40.3	25.9	18.0	12.8	1.6		
46011	34.9N	120.9W	742	4.0	08 04	1.6	10.7	46.2	34.5	8.2	0.2			
46012	37.4N	122.7W	737	3.5	08 00	1.5	6.7	58.8	28.7	5.5				
46013	38.2N	123.3W	743	4.0	07 15	1.6	8.3	50.2	35.6	5.5	0.2			
46014	39.2N	124.0W	741	5.0	27 03	2.0	0.6	41.8	38.3	15.5	3.6			
46022	40.8N	124.5W	737	5.5	26 19	2.4		35.6	31.0	17.7	15.4			
46023	34.3N	120.7W	743	4.5	08 04	2.0	5.7	28.6	47.6	13.0	4.8			
46024	33.0N	119.2W	738	3.5	08 04	1.4	8.8	64.0	24.3	2.7				
46025	33.8N	119.3W	742	2.5	24 11	0.9	27.3	67.9	4.7					
46026	37.8N	122.7W	737	3.0	30 10	1.2	16.9	61.7	21.1	0.1				

OCTOBER 1982			TOTAL FREQUENCY OF WIND SPEEDS (%)						TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY#	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W		6.7	27.2	41.4	22.0	2.7		29.2	21.4	7.0	11.3	9.0	5.9	5.0	11.2
41002	32.3N	075.7W		3.1	39.6	50.9	6.4			19.9	34.6	10.2	9.6	2.5	6.3	8.6	5.9
41006	29.3N	077.3W		1.8	40.9	50.5	0.8			9.9	29.2	14.9	9.3	2.6	3.4	5.1	11.2
42001	25.9N	089.7W		5.2	33.3	61.0	0.5			11.1	33.4	25.9	25.9	2.0	0.3	0.5	1.0
42002	26.0N	093.5W		3.0	34.0	60.5	2.5			11.0	24.9	26.6	25.6	7.3	0.9	2.1	1.6
42003	26.0N	086.0W	0.5	3.9	42.9	52.7	0.4			15.4	30.7	17.4	9.7	4.0	0.2		2.5
42007	30.1N	088.9W		5.7	41.8	52.2	0.3			18.3	28.8	19.1	13.5	5.7	3.2	3.7	7.6
44003	40.8N	068.5W		8.1	51.0	36.0	4.7	0.1		14.2	20.2	9.4	7.8	6.5	14.5	16.7	10.8
44004	39.0N	070.7W		5.5	39.8	42.9	11.9			19.6	21.3	6.1	8.0	4.6	12.3	15.1	11.0
44005	42.7N	068.7W		4.2	38.2	41.6	14.3	1.7		8.8	29.5	10.1	6.1	4.1	22.3	11.9	7.2
44007	43.5N	070.1W		7.6	44.6	47.4	0.4			16.2	10.8	5.1	2.9	13.9	21.1	14.7	15.4
44008	40.5N	069.4W		6.6	53.1	34.8	5.3	0.1		16.7	20.4	8.8	8.0	8.3	11.9	16.3	9.8
44009	38.5N	074.7W		7.0	33.7	55.8	3.6			8.3	6.6	6.7	9.0	22.9	21.4	10.3	14.8
44020	41.4N	070.3W		2.7	44.7	51.3	1.3			7.7	7.7	17.8	15.2	11.4	11.4	11.1	11.1
45001	48.3N	087.8W		5.2	43.4	48.5	2.9			7.4	1.6	4.4	8.3	24.5	18.8	16.3	18.8
45002	47.2N	086.5W		5.2	48.7	44.2	1.9			10.2	4.9	8.3	7.8	17.0	22.2	15.6	14.0
45003	41.7N	082.4W		4.7	56.8	34.1	4.4			5.3	5.3	13.1	8.5	9.9	22.1	20.4	15.2
45006	47.3N	090.0W		5.4	46.5	44.8	3.3			8.7	12.9	11.8	12.7	9.0	28.4	10.4	6.0
45007	42.7N	087.1W		5.0	43.1	48.8	3.1			8.0	2.2	5.6	14.0	31.1	15.5	13.0	10.7
45008	44.3N	082.4W		2.7	41.4	51.7	4.2			9.0	2.8	3.7	7.2	26.9	22.2	15.0	13.2
46011	34.9N	120.9W		1.8	12.4	30.2	25.4			10.7	2.7	1.5	2.7	5.1	13.5	32.1	32.1
46021	42.5N	130.0W		1.3	17.3	69.5	11.9			18.1	16.7	3.9	3.0	19.2	12.2	14.8	12.0
46023	52.0N	156.0W		1.8	8.8	43.0	41.5	5.0		20.2	2.7	3.1	2.4	9.5	17.8	16.3	33.1
46034	51.0N	136.0W		2.6	15.8	45.0	34.1	2.6		9.4	5.0	1.4	2.0	15.2	22.5	24.3	20.2
46035	46.0N	131.0W		3.3	21.6	54.7	19.0	1.4		17.3	8.0	1.2	4.1	13.1	19.4	21.7	15.1
46061	40.7N	137.7W		5.0	75.0	38.1	30.4	1.5		10.9	11.1	12.5	8.3	12.3	14.9	18.1	11.9
46101	46.2N	124.2W		3.4	30.2	58.9	7.5			11.0	6.9	15.6	7.5	36.4	10.0	6.3	6.4
46111	34.9N	120.9W		15.0	42.2	37.3	5.5			19.6	5.9	3.7	2.4	2.5	2.3	8.4	55.2
46121	37.4N	122.7W		15.1	52.1	30.0	2.8			27.9	1.7	1.6	8.2	13.8	4.0	5.6	37.1
46131	38.2N	121.5W		12.9	44.9	38.6	3.5			8.3	0.9	4.0	12.9	10.0	2.9	8.3	52.7
46134	39.2N	124.0W		15.4	19.3	54.1	11.2			25.1	6.4	7.6	7.6	23.8	3.3	2.5	23.7
46161	43.3N	177.7W		3.3	10.0	52.5	14.2			43.3	13.1	13.2	4.6	0.7	6.6	7.0	9.6
46171	60.3N	172.1W		10.5	12.5	43.0	14.0			2.5	23.7	25.0	6.9	5.8	12.1	14.6	9.4
46181	60.3N	177.7W			14.0	45.5	19.3	1.2		19.8	18.0	11.9	11.6	7.9	7.7	13.3	9.8
46191	57.2N	177.7W		4.1	27.6	51.4	16.5	0.4		21.7	13.1	9.3	4.8	2.7	14.1	14.4	19.8
46201	55.9N	168.0W			18.6	55.9	25.5			23.8	11.1	4.7	2.5	4.8	17.0	18.7	17.4
46211	57.7N	167.0W			19.7	54.2	25.6	0.4		19.2	5.4	1.5	7.0	5.1	11.4	12.1	38.2
46221	40.8N	124.5W	25.3		15.5	29.6	9.6			20.6	7.7	6.6	15.3	26.9	5.4	3.4	6.0
46231	34.3N	120.7W		4.6	34.6	52.9	7.9			22.2	0.7	2.1	1.8	1.2	1.2	2.6	68.1
46241	33.0N	119.2W		3.0	42.3	50.7	4.0			12.0	4.1	1.3		0.1	1.3	3.8	77.4
46251	33.8N	119.3W		26.8	42.5	10.5	0.3			8.7	7.7	6.1	5.8	2.9	5.0	29.1	36.8
46261	37.8N	122.7W		18.8	51.7	29.2	0.3			3.7	2.9	6.1	6.9	13.8	4.6	14.3	47.6

OCTOBER 1982			% FREQUENCY OF WIND SPEEDS (<4 KTS)							% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY#	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	0.61	1.31	1.41	1.41	1.51	0.51	0.11	0.61	0.71	9.31	4.71	2.21	3.61	2.81	1.11	0.21	2.51	11.81	10.11	2.21	5.41	2.11	2.01	3.61	4.61
41002	32.3N	075.7W	0.41	0.81	0.71	0.61	0.21		0.11	0.21	5.21	15.61	3.01	1.01	3.21	1.01	0.21	0.11	5.21	7.51	1.01	0.31	4.31	5.31	5.31	5.31
41006	29.3N	077.3W	0.81	0.41	0.51	0.71	0.11	0.31	0.51	1.01	5.61	9.51	3.11	1.01	1.61	0.11	2.11	6.01	3.51	19.31	20.81	1.11	0.91	3.01	2.51	3.41
42001	25.9N	089.7W	0.11	1.51	1.21	1.71	0.31	<.05		0.41	1.81	9.41	11.11	9.01	1.11	0.21	0.41	0.31	9.21	22.11	13.51	15.11	0.61	<.05	0.11	0.31
42002	26.0N	093.5W	0.11	0.71	0.21	0.51	0.41		0.81	0.61	3.31	7.11	13.91	7.71	0.71		0.81	0.41	6.91	16.21	12.41	17.21	6.11	0.91	0.41	0.31
42003	26.0N	086.0W	0.11	0.81	1.61	0.61	0.51	0.11			1.41	8.41	9.91	13.41	6.11	2.61	<.05		1.11	10.41	14.91	22.41	2.71	1.01		
42007	30.1N	088.9W	0.61	0.41	1.11	0.91	0.41	0.61	0.51	1.11	6.11	9.71	8.01	7.91	4.11	1.61	1.41	1.01	11.61	18.41	10.01	4.71	1.21	1.01	1.81	3.51
44003	40.8N	068.5W	0.51	0.71	0.91	1.11	1.81	2.21	0.51	0.51	6.91	4.71	2.11	5.71	4.61	10.51	11.31	5.31	6.41	10.81	4.01	0.61	0.11	1.81	5.01	5.01
44004	39.0N	070.7W	0.21	0.21	0.71	0.51	0.71	0.81	0.61	0.41	7.01	2.21	5.81	2.91	7.51	5.61	2.51	9.41	10.81	2.61	1.61	1.11	1.51	3.91	6.01	6.01
44005	42.7N	068.7W		1.31	0.61	0.41	0.21	0.81	0.91	0.11	4.81	5.81	3.31	2.61	3.61	8.51	6.71	3.01	2.71	10.51	5.71	2.81	0.51	12.71	4.31	2.31
44007	43.5N	070.1W	0.61	0.61	0.61	0.91	1.81	0.71	1.01	1.31	7.01	2.51	1.81	1.81	7.71	10.91	8.21	4.71	8.31	7.71	2.71	0.21	4.41	9.61	5.51	9.11
44008	40.5N	069.4W	0.61	0.41	0.91	1.11	0.71	0.51	0.51	1.21	9.01	3.71	4.71	6.11	7.41	9.21	8.71	4.31	6.91	11.31	2.91	0.61	0.11	1.71	7.11	4.31
44009	38.5N	074.7W	1.41	0.61	0.51	0.71	0.71	1.31	0.81	0.71	0.91	3.21	0.71	1.11	3.21	9.21	6.11	5.91	2.21	2.31	4.81	5.01	5.01	12.41	11.51	9.41
44020	41.4N	070.3W	0.11		0.11	<.05	0.91	0.41	0.51	0.61	4.01	2.21	3.11	4.01	9.21	12.21	5.11	4.91	5.61	0.31	1.31	3.71	7.81	22.21	5.71	4.71
45001	48.3N	087.8W	1.11	0.31	0.71	0.61	0.51	1.01	1.01	4.11	0.91	1.51	2.51	11.71	7.91	9.91	4.91	2.21	0.31	2.71	5.51	12.01	9.61	4.71	11.61	
45002	47.2N	086.5W	0.41	0.41	0.81	0.71	1.01	0.61	0.41	1.61	1.91	3.51	9.81	9.41	7.91	3.81	2.51	5.61	0.41	0.21	2.51	6.41	8.21	12.51	9.31	5.31
45003	41.7N	082.4W	0.51	0.31	0.51	0.31	0.51	0.41	0.81	1.11	3.41	3.71	7.61	5.71	6.51	12.91	9.21	8.01	1.51	1.41	4.71	2.51	2.91	8.61	6.51	6.11
45006	47.3N	090.0W	0.61	0.41	0.81	0.71	1.01	1.71	0.51	0.61	3.11	3.41	4.91	6.11	5.91	14.41	3.51	3.11	3.61	7.61	5.91	4.01	2.11	12.81	6.21	2.41
45007	42.7N	087.1W	0.51	0.71	0.61	0.71	0.51	0.71	0.41	0.61	2.41	2.61	3.11	9.81	13.51	2.41	5.41	4.51	1.11	1.51	3.51	17.31	8.01	8.71	4.21	
45008	44.3N	082.4W	0.21	0.41	0.51	0.71	0.41	0.11	0.21	0.61	4.71	2.01	1.21	3.41	10.71	8.81	7.11	3.61	4.11	0.41	2.01	3.51	15.21	9.31	5.71	8.41
46011	56.0N	148.0W	0.31	0.61	0.11		0.41	0.11	0.41	<.05	1.91	0.31	0.91	0.51	0.91	1.71	3.01	3.21	4.21	1.81	0.11	1.61	3.61	8.91	24.51	18.01
46021	42.5N	130.0W		0.51	0.11		0.11	0.41		0.11	1.81	1.91	1.31	0.91	3.41	1.81	2.61	3.51	15.21	13.51	2.31	2.11	11.81	7.11	10.31	7.11
46023	52.0N	156.0W	0.21		0.21	0.71	0.31	0.71	0.21	0.21	0.81	0.21	1.01	0.41	0.21	1.31	3.01	6.41	1.21	0.11	3.01	6.41	1.11	0.71	0.51	2.21	8.11	10.31	7.81
46034	51.0N	136.0W	0.11	<.05	0.21	0.21	0.21	0.21	0.91	0.51	1.81	2.31	1.11	0.51	0.51	3.61	3.91	2.11	4.21	2.51		0.41	5.21	8.91	11.81	12.11
46035	46.0N	131.0W	0.61	1.71	0.31	0.71	0.21	0.21	0.61	0.71	3.81	1.11	0.41	1.21	7.71	4.01	2.61	1.71	9.11	5.91	0.51	2.01	3.71	10.31	13.61	9.51
46061	40.7N	137.7W	0.51	0.71	0.51	0.51	0.61	0.71	0.71	3.71	2.81	4.41	3.61	3.11	5.61	2.61	3.21	4.21	5.51	3.61	2.51	5.61	4.01	10.21	2.61	
46101	46.2N	124.2W	0.61	0.41	0.51	0.71	0.71	0.51	0.41	0.81	3.61	2.31	3.61	2.71	3.81	5.61	2.71	12.71	3.51	12.21	2.41	0.31	0.21	1.01	<.05	1.51	28.81
46111	34.9N	120.9W	2.61	3.11	2.11	1.11	0.41	1.11	1.41	2.41	11.71	2.21	1.31	0.91	1.11	1.11	5.51	18.31	5.11	0.31	0.31	0.21	1.01	<.05	1.51	28.81
46121	37.4N	122.7W	4.31	0.41	1.21	1.11	1.31	0.51	1.51	9.71	14.31	0.81	0.61	3.21	7.11	2.91	3.11	20.11	7.91	0.21		2.71	4.61	0.71		1.11	12.81
46131	38.2N	121.5W	2.01	0.41	1.31	1.61	1.41	0.51	0.41	3.11	5.41	2.21	1.91	1.31	5.41	4.61	2.01	4.61	20.41	0.41	0.41	0.51	0.41	1.31	0.41	12.51
46134	39.2N	124.0W	2.51	7.21	3.31	2.41	1.41	1.21	1.41	1.11	12.41	4.11	4.21	4.11	5.31	1.41	0.71	6.91	10.01	0.11		0.71	10.41	0.71	0.41	11.81
46161	43.3N	177.7W	0.41	1.61	0.31					0.81	5.71	3.51	3.81	1.81	0.71	1.71	1.31	2.01	37.21	6.51	6.91	2.71		3.31	3.31	3.81
46171	60.3N	172.1W	1.51	1.21	1.91	1.91	0.41	1.31	0.41	1.81	1.01	10.51	9.01	5.51	1.81	2.71	4.61		11.51	12.21	1.31	2.21	4.91	9.31	1.51	
46181	60.3N	177.7W								6.61	7.81	4.01	4.61	2.01	7.81	2.51	3.41	11.81	7.41	5.71	6.51	2.41	3.91	9.31	3.71	
46191	57.2N	170.3W	0.41	0.41		0.41	0.81	1.21	0.71	0.11	4.91	5.11	4.91	2.21	0.41	2.31	5.21	5.11	3.71	6.21	2.41	0.61	1.01	6.61	7.81	13.21
46201	55.9N	168.0W								0.41	5.91	0.91		0.71	2.01	3.11	1.91	14.51	2.81	2.51	0.91	2.11	8.61	11.51	12.91	
46211	57.7N	167.0W								0.41	2.91	0.71	1.81	1.91	1.41	1.91	9.61	1.21	0.71	4.81	3.91	0.91	2.11	8.61	11.51	12.91
46221	40.8N	124.5W	3.91	7.91	4.11	4.11	2.61	1.51	2.21	3.01	10.91	3.71	2.61	8.31	4.51	2.01	0.81	2.71	11.41	0.11		2.41	13.21	1.71	0.51	0.31
46231	34.3N	120.7W	1.11	0.71	0.31	0.51	0.21	<.05	0.61	1.61	5.91	0.31	1.11	1.21	0.61	1.21	1.71	22.71	13.01	0.21	0.71	0.11	0.41	<.05	0.31	38.21
46241	33.0N	119.2W	0.41	0.41	0.21		0.11		0.21	1.01	7.01	1.21	0.41	0.21	0.11	0.11	0.91	3.01	27.71	4.61	0.31	0.11		0.81	0.31	44.51
46251	33.8N	119.3W	2.61	2.51	2.61	2.81	2.21	1.41	1.61	5.61	4.91	5.01	3.21	2.11	0.71	1.61	19.31	25.21	0.41	0.11	0.31	0.91		1.41	0.31	0.31
46261	37.8N	122.7W	2.11	1.41	1.71	2.21	3.21	1.41	3.11	3.71	1.71	1.11	4.11	2.81	6.01	2.61	8.71	24.71		0.51	0.31	1.91	4.41	0.51	2.61	19.11

OCTOBER 1982			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)							% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY#	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.3W	7.11	4.61	0.11	0.81	3.21	2.81	0.81	3.61		1.71	0.61		0.41											
41002	32.3N	075.7W	0.11	3.01			0.81	1.61	0.81																	
41006	29.3N	077.3W																								
42001	25.9N	089.7W		<.05						0.81																
42002	26.0N	093.5W	0.71	1.21		0.61	0.11																			
42003	26.0N	086.0W	0.11	<.05	0.11	0.11																				
42007	30.1N	088.9W		0.31																						
44003	40.8N	068.5W		4.31	0.41							0.11														
44004	39.0N	070.7W	3.61	3.71	2.61						0.31	1.91														
44005	42.7N	068.7W	1.31	10.71	0.41	0.21		0.21				1.91	1.51	0.21												
44007	43.5N	070.1W	0.11		0.51	0.71	0.11	0.71	1.31	0.21		0.31														
44008	40.5N	069.4W	0.21	4.41	0.31							<.05														
44009	38.5N	074.7W	1.41	0.51				1.01	0.31	0.41		0.11														
44020	41.4N	070.3W						0.41		0.91																
45001	48.0N	087.8W	1.41	0.51				1.01	0.31	0.41																
45002	47.2N	086.5W						0.41		0.91																
45003	45.3N	082.4W						1.01	0.61	1.31																
45006	47.2N	086.5W	1.11	0.41						0.41																
45007	41.7N	087.0W						0.41	0.31	1.91																
45008	47.3N	090.0W	1.31	1.61	0.21				0.21																	
44071	42.7N	087.1W	0.11		0.51	0.71	0.11	0.71	1.31	0.21																
45008	44.3N	082.4W						0.41	1.31	2.01	0.51															
46011	56.0N	148.0W	4.31	0.11	0.31	0.61	0.31	2.51	4.21	10.91																
46021	42.5N	130.0W	1.11	0.91			3.91	2.91	1.91	1.21																
46023	52.0N	156.0W	10.11	0.81	0.41	1.11	1.61	6.51	3.81	15.21	2.71	0.51	0.71	<.05			1.01									
46034	51.0N	136.0W	3.41	0.21	0.11	0.81	8.81	7.71	7.71	5.41				0.11	0.41	2.01										
46035	46.0N	131.0W	3.81	<.05		0.61	1.71	5.01	3.51	3.51					0.41		0.91	0.11								
46061	40.7N	137.7W	2.11	2.51	4.31	3.11	2.71	6.11	4.31	5.31	0.41	<.05			0.51	0.11	0.11									
46101	46.2N	124.2W			0.41	<.05	6.41	0.61																		
46111	34.9N	120.9W								5.61																
46121	37.4N	122.7W	1.01	<.05		0.51	0.81			0.41																
46131	38.2N	123.3W				0.41	0.41			2.81																
46134	39.2N	124.0W	0.21			0.51	6.71			3.91																
46161	43.3N	177.7W		1.41	2.31	0.11		0.11	2.61	3.81																
46171	60.3N	172.1W		0.71	3.01	1.21	1.21	4.11	2.11	1.91																
46181	60.3N	177.7W	1.41	2.91	2.21	0.51	3.51	0.61	6.71	1.51																
46191	57.2N	170.3W	2.71	1.31	2.01	1.71	0.41	4.71	0.61	4.01				0.41												
46201	55.9N	168.0W	5.31	2.41	1.21	1.61	1.91	0.81	4.01	2.61																
46211	57.7N	160.0W	3.41	2.01		0.41		1.51	3.81	12.61																
46221	40.8N	124.5W	2.41			0.41	6.61	0.11																		
46231	34.3N	120.7W	2.21							5.61																
46241	33.0N	119.2W								4.01																
46251	33.8N	119.3W						0.11	0.21																	
46261	37.8N	122.7W				<.05	0.31																			

NOVEMBER 1982

BUOY	LAT	LONG	AIR TEMPERATURE (DEG C) OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	SEA TEMPERATURE (DEG C) OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	AIR-SEA TEMPERATURE DIFFERENCE (DEG C) OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.3W	694	29	23.8	05 13	13.1	16 03	19.3	694	29	23.6	02 17	21.2	28 04	22.5	694	29	00.6	29 21	-09.0	16 03	-03.2
41002	32.3N	075.3W	720	30	24.6	04 15	16.4	16 04	21.4	720	30	25.5	27 20	22.8	29 10	23.8	720	30	01.3	29 20	-07.3	14 07	-02.3
41006	29.3N	077.3W	718	30	26.8	04 20	19.3	06 04	23.8	718	30	27.1	05 03	24.8	18 02	25.6	718	30	00.7	30 17	-07.0	06 06	-01.8
42001	25.9N	089.7W	719	30	26.7	03 19	19.6	06 07	24.1	719	30	28.5	01 20	25.9	16 [illegible]	26.8	719	30	-00.8	11 14	-07.2	04 21	-02.7
42002	26.0N	093.5W	720	30	27.5	01 22	19.3	05 00	24.6	720	30	28.1	01 20	25.3	18 11	26.7	720	30	00.9	20 15	-07.8	05 00	-02.0
42003	26.0N	086.0W	716	30	27.5	03 20	17.8	05 23	24.6	717	30	27.8	03 18	26.5	29 12	27.0	717	30	00.0	30 15	-09.5	05 23	-02.5
42007	30.1N	088.9W	719	30	23.7	02 18	07.9	13 14	17.9														
44003	40.8N	068.5W	719	30	20.4	05 18	01.7	28 11	11.5	719	30	18.3	05 18	11.3	29 14	13.2	719	30	05.7	05 14	-09.8	28 11	-01.7
44004	39.0N	070.0W	707	30	22.6	05 15	06.3	28 03	15.1	707	30	23.7	22 18	17.3	28 09	20.5	712	30	02.0	13 16	-14.5	25 13	-05.4
44005	42.7N	068.3W	697	30	16.7	05 17	00.4	28 14	09.5	720	30	12.8	05 06	09.2	30 [illegible]	10.5	720	30	05.1	05 14	-09.2	27 14	-01.3
44007	43.5N	070.1W	679	30	15.0	05 16	00.0	28 19	07.6	692	30	12.3	01 18	08.9	25 14	10.5	720	30	03.3	08 20	-09.7	16 12	-03.2
44008	40.5N	069.4W	709	30	20.9	05 16	01.2	28 04	11.6	710	30	17.8	04 09	11.4	24 22	14.0	712	30	05.0	04 00	-12.3	28 03	-02.4
45001	48.0N	087.6W	284	15	06.8	01 15	00.0	05 05	03.5	402	17	05.6	01 17	04.4	14 [illegible]	05.0	402	17	01.4	01 15	-05.2	08 23	-02.4
45002	45.3N	086.3W	598	28	11.9	20 18	00.1	14 16	05.6	720	30	10.4	01 17	07.5	30 23	09.0	720	30	03.2	21 00	-09.2	05 07	-04.3
45003	45.3N	082.8W	620	29	10.8	12 16	00.0	15 18	05.3	711	30	09.1	03 22	06.0	26 04	07.4	715	30	03.3	21 06	-07.6	13 16	-02.8
45004	47.2N	086.5W	309	15	07.5	01 04	00.0	09 09	03.7	394	17	06.4	01 01	04.7	14 01	05.5	395	17	01.1	01 04	-05.6	09 09	-02.6
45005	41.7N	082.5W	691	30	17.9	03 00	00.0	15 14	07.4	719	30	13.2	01 17	06.1	28 07	09.1	719	30	05.3	12 14	-10.9	05 09	-02.0
45006	47.3N	090.0W	105	05	09.6	01 18	00.0	05 03	05.3	114	05	08.2	01 20	06.7	04 20	07.4	114	05	01.7	01 18	-07.0	04 15	-02.5
45007	42.7N	087.1W	639	30	12.3	02 10	00.0	14 22	05.8	719	30	09.5	01 20	06.4	28 08	07.3	719	30	04.3	12 07	-08.0	04 17	-02.2
45008	44.3N	082.4W	657	29	12.7	03 00	00.0	13 19	05.8	709	30	10.1	03 01	06.5	26 16	07.9	714	30	03.1	12 16	-07.9	13 19	-02.5
46001	56.0N	148.0W	720	30	07.6	08 21	00.1	30 23	05.4	720	30	07.4	01 03	06.1	29 09	06.7	720	30	01.3	25 20	-06.0	30 23	-01.3
46002	42.5N	130.0W	718	30	15.7	03 12	08.6	07 22	12.4	719	30	15.2	01 22	12.8	30 18	13.8	719	30	00.7	03 12	-05.7	07 22	-01.4
46003	52.0N	156.0W	715	30	08.5	08 13	01.7	30 23	05.7	716	30	08.3	01 01	06.4	30 20	07.4	716	30	00.7	08 13	-04.8	04 09	-01.6
46004	51.0N	136.0W	720	30	11.3	02 01	04.1	20 21	07.9	720	30	10.4	01 01	08.4	30 05	09.1	720	30	01.5	25 18	-04.6	08 06	-01.2
46005	46.0N	131.0W	638	27	14.1	03 13	05.9	21 04	10.1	641	27	14.7	01 22	12.6	24 15	13.5	644	27	-00.4	03 13	-07.1	07 17	-03.4
46006	40.7N	137.7W	719	30	20.5	03 02	13.6	19 19	17.2	719	30	15.2	04 21	13.1	30 21	14.2	719	30	05.5	03 02	-00.4	07 22	03.0
46010	46.2N	124.2W	716	30	14.3	03 01	04.0	22 16	09.3	716	30	13.1	01 21	09.7	21 03	11.9	717	30	01.5	03 01	-07.7	22 16	-02.6
46011	34.9N	120.9W	719	30	19.2	27 00	10.6	09 12	15.4	720	30	18.6	03 21	15.7	02 15	17.0	720	30	02.0	27 00	-05.8	09 12	-01.6
46012	37.4N	122.7W	720	30	19.4	04 00	09.2	10 03	14.0	720	30	16.1	03 23	13.7	10 07	15.0	720	30	03.8	02 23	-04.8	09 07	-00.9
46013	38.2N	123.3W	720	30	18.7	04 00	08.3	15 16	12.9	720	30	15.6	03 23	13.8	19 14	14.4	720	30	03.1	04 00	-05.9	14 15	-01.5
46014	39.2N	124.0W	720	30	17.6	03 23	07.0	08 14	13.0	718	30	16.4	03 20	12.6	12 12	14.5	720	30	01.9	27 02	-06.4	08 14	-01.5
46016	63.3N	170.3W	017	08	00.7	10 12	00.1	11 09	00.4														
46017	60.3N	172.3W	131	20	05.5	06 21	00.1	06 03	01.7														
46018	60.3N	177.0W	125	23	04.1	07 09	00.0	06 15	01.5														
46019	57.2N	170.3W	203	29	05.8	07 12	00.1	02 18	02.4														
46020	55.9N	168.0W	227	29	06.9	07 15	00.3	02 03	03.9	239	30	06.2	01 03	05.1	17 12	05.4	240	30	01.4	11 21	-05.5	02 03	-01.6
46021	57.7N	160.0W	131	20	07.2	08 09	00.1	16 06	03.4														
46022	40.8N	124.5W	720	30	16.8	04 00	09.0	08 11	12.7	720	30	15.5	02 22	12.3	12 11	13.8	720	30	02.1	27 02	-04.2	30 08	-01.1
46023	34.3N	120.7W	720	30	20.4	03 00	10.8	11 00	16.2	720	30	18.8	03 23	16.2	10 05	17.3	720	30	02.7	03 00	-05.6	11 00	-01.1
46024	33.0N	119.2W	719	30	20.3	04 22	11.3	11 06	16.5	719	30	20.1	02 23	17.1	11 15	18.1	719	30	01.6	26 18	-06.4	09 20	-01.5
46025	33.8N	119.3W	719	30	22.5	03 00	12.1	10 11	16.8	719	30	18.9	03 01	16.4	17 12	17.4	720	30	03.8	03 00	-05.5	10 11	-00.6
46026	37.8N	122.7W	717	30	18.7	02 23	07.9	15 16	12.5	717	30	15.4	02 00	12.8	16 17	13.9	718	30	03.7	02 23	-05.6	09 14	-01.4

NOVEMBER 1982

BUOY	LAT	LONG	PRESSURE (MB) OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	WIND SPEEDS (KNOTS) OBS	MAX	DY HR	DIR	MEAN WIND SPEED (KNOTS) N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.7N	072.3W	694	29	1034.2	26 02	1009.2	23 07	1021.8	694	36	13 16	150	18.2	16.9	14.3	18.5	19.1	16.9	16.6	18.5	17.7
41002	32.3N	075.3W	719	30	1032.7	26 03	1012.0	23 08	1020.9	717	25	25 04	030	14.8	15.3	11.8	10.4	13.0	14.1	10.9	13.6	13.6
41006	29.3N	077.3W	718	30	1030.1	26 15	1013.2	04 08	1019.8	714	25	17 10	110	11.7	17.0	13.9	11.6	10.9	9.0	5.9	7.9	13.1
42001	25.9N	089.7W	719	30	1025.6	05 18	1007.7	03 19	1018.2	717	30	04 04	350	21.4	15.5	9.9	11.5	11.9	7.9	2.5	19.1	13.5
42002	26.0N	093.5W	720	30	1028.2	05 16	1007.1	03 09	1017.8	719	36	03 14	340	18.7	15.2	12.6	12.1	13.2	9.2	6.6	10.9	13.4
42003	26.0N	086.0W	717	30	1024.8	25 16	1009.1	03 23	1018.2	713	26	05 10	360	18.1	15.9	11.7	10.9	10.5	8.8	4.0	16.2	13.1
42007	30.1N	088.9W	719	30	1029.7	25 15	1009.0	03 22	1019.8	719	29	04 06	350	17.5	11.9	9.4	9.1	8.6	8.1	8.9	15.0	11.3
44003	40.8N	068.5W	719	30	1034.1	20 05	1003.2	29 20	1021.4	719	25	25 01	310	13.3	12.4	9.3	10.3	14.4	10.7	14.5	15.6	13.2
44004	39.0N	070.0W	709	30	1035.0	26 02	1006.6	13 16	1022.2	710	30	24 22	310	14.3	15.7	11.7	7.3	15.2	14.8	14.3	16.6	14.7
44005	42.7N	068.3W	720	30	1038.7	20 05	999.6	29 21	1021.1	719	33	16 02	310	16.9	12.3	13.5	12.8	19.5	17.4	19.4	21.7	17.7
44007	43.5N	070.1W	720	30	1040.3	20 04	1000.2	29 20	1020.8	716	29	13 09	200	10.1	8.7	6.7	5.1	13.8	13.9	15.9	13.1	12.7
44008	40.5N	069.4W	711	30	1034.1	20 05	1003.1	29 20	1021.7	689	29	25 02	300	13.0	13.6	11.7	11.5	15.2	13.0	14.5	17.2	14.2
45001	48.0N	087.6W	402	17	1037.7	09 17	986.8	12 15	1015.9	397	31	12 18	320	11.6	13.1	9.4	12.7	11.1	13.0	12.5	15.9	12.8
45002	45.3N	086.3W	720	30	1036.4	27 15	982.6	12 12	1017.4	716	26	12 21	310	10.7	8.3	9.4	10.6	14.7	13.5	11.7	13.1	11.8
45003	45.3N	082.8W	715	30	1034.7	27 16	983.9	12 19	1017.4	712	29	12 23	290	6.4	7.1	10.1	10.4	11.8	12.4	13.0	15.0	12.2
45004	47.2N	086.5W	394	17	1036.7	09 16	979.3	12 13	1015.4	390	29	12 20	340	14.2	6.4	7.2	10.3	7.2	10.5	11.9	13.7	11.0
45005	41.7N	082.5W	719	30	1037.4	27 15	996.3	12 18	1020.7	716	30	12 20	250	9.3	8.2	9.9	7.6	10.4	14.0	14.8	11.7	12.1
45006	47.3N	090.0W	114	05	1016.4	05 15	1006.3	04 05	1011.7	103	25	04 09	030	16.1	9.2	6.8	7.0	7.4	4.9		8.2	10.4
45007	42.7N	087.1W	690	30	1036.6	27 16	989.4	12 12	1019.1	718	28	12 16	290	9.4	8.6	13.8	11.2	12.7	14.2	14.2	14.1	13.0
45008	44.3N	082.4W	709	30	1036.4	27 16	987.7	12 19	1018.4	709	28	12 21	240	9.5	7.6	8.6	11.7	12.6	13.9	14.7	14.9	13.0
46001	56.0N	148.0W	720	30	1024.6	12 01	965.4	26 08	1002.4	717	26	12 17	180	11.2	16.0	18.0	16.5	13.3	10.1	13.1	11.7	13.0
46002	42.5N	130.0W	719	30	1028.5	01 18	989.6	18 09	1012.8	715	32	30 12	310	17.1	14.6	14.3	12.1	18.2	17.7	18.0	18.0	16.7
46003	52.0N	156.0W	716	30	1027.0	06 20	980.4	29 11	1003.2	716	37	05 23	270	18.4	16.7	22.4	20.4	19.7	18.1	21.0	19.2	19.7
46004	51.0N	136.0W	720	30	1030.1	12 20	985.7	29 14	1009.5	715	37	25 07	140	17.4	11.0	13.1	22.3	16.4	14.3	17.5	17.3	16.8
46005	46.0N	131.0W	643	27	1028.9	01 19	985.6	18 13	1013.3	636	34	03 13	190	10.9	10.8	12.1	9.4	19.5	17.8	17.8	17.9	15.8
46006	40.7N	137.7W	719	30	1033.2	06 18	998.3	26 23	1014.7	718	38	30 03	290	18.3	11.3	15.7	18.0	20.2	16.5	23.4	21.3	19.7
46010	46.2N	124.2W	716	30	1030.2	01 20	984.5	30 08	1013.2	712	30	16 14	180	8.0	6.9	13.5	12.2	18.1	13.8	11.3	10.2	13.4
46011	34.9N	120.9W	720	30	1023.8	11 18	998.6	30 13	1014.8	698	30	30 13	240	7.2	7.6	4.9	7.7	11.8	14.3	9.3	10.7	09.1
46012	37.4N	122.7W	713	30	1026.2	11 19	996.3	30 15	1016.0	674	35	30 20	320	10.2	8.6	7.4	10.3	14.1	11.2	12.5	12.9	10.6
46013	38.2N	123.3W	711	30	1026.9	11 19	996.3	30 17	1016.5	706	34	30 14	290	7.1	6.5	11.1	10.6	10.3	11.6	10.4	14.5	11.3
46014	39.2N	124.0W	708	30	1026.5	11 19	995.9	30 19	1015.8	703	38	30 17	300	13.5	4.8	6.0	9.6	14.0	10.0	11.4	15.9	10.9
46016	63.3N	170.3W	233	30	1018.4	17 12	984.2	13 06	1003.5	229	42	07 21	100	14.2	23.4	15.8	13.4	13.4	8.2	15.3	13.6	17.6
46017	60.3N	172.3W	236	30	1018.2	30 21	972.7	12 06	999.1	235	35	01 21	050	11.7	22.4	20.6	14.4	15.1	13.4	11.4	5.9	17.2
46018	60.3N	177.0W	238	30	1016.3	30 12	970.6	10 06	998.8	236	37	26 09	090	19.2	21.1	16.2	20.5	17.4	18.0	11.6	13.4	18.7
46019	57.2N	170.3W	239	30	1021.8	17 12	966.0	12 18	997.6	238	37	11 21	110	17.8	20.1	18.1	12.4	12.6	14.8	15.3	16.2	16.3
46020	55.9N	168.0W	238	30	1020.8	17 12	965.6	12 18	996.6	238	40	11 18	090	15.4	16.8	12.8	20.1	20.9	20.0	18.5	17.3	17.5
46021	57.7N	160.0W	153	20	1021.1	06 21	982.6	13 06	1004.9	153	34	10 12	160	9.1	11.4	15.2	17.9	24.1	17.8	14.3	16.5	15.0
46022	40.8N	124.5W	720	30	1026.1	12 09	986.3	30 12	1014.7	711	30	30 12	260	11.4	5.6	4.4	9.2	12.5	11.8	10.8	9.4	10.3
46023	34.3N	120.7W	720	30	1023.5	12 06	1000.6	30 15	1014.9	688	31	30 18	310	9.7	4.2	6.9	8.5	9.2	12.3	9.4	10.9	09.9
46024	33.0N	119.2W	719	30	1023.1	11 19	1003.0	30 22	1014.8	690	33	30 20	300	6.3	6.7	4.7	3.7	10.1	12.6	9.1	10.1	09.3
46025	33.8N	119.3W	719	30	1023.9	11 19	1001.4	30 17	1015.2	702	30	30 16	240	4.8	5.3	5.5	4.1	5.3	8.2	8.4	7.7	06.9
46026	37.8N	122.7W	708	30	1026.6	11 20	996.5	30 17	1016.2	704	32	30 13	300	5.3	10.5	10.8	9.5	13.7	10.1	12.1	11.3	10.8

NOVEMBER 1982

BUOY	LAT	LONG	WAVE HEIGHTS (METERS) OBS	MAX	DY HR	MEAN	FREQUENCY OF WAVE HEIGHTS (%) <1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.7N	072.3W	694	5.5	23 12	2.1	0.2	48.1	23.3	19.3	8.9			
41002	32.3N	075.3W	720	5.0	23 01	2.2		29.0	50.0	14.8	6.1			
41006	29.3N	077.3W	717	4.0	07 22	2.2		33.7	33.4	31.5	1.2			
42001	25.9N	089.7W	719	4.0	04 17	1.4	21.5	51.5	18.4	7.9	0.4			
42002	26.0N	093.5W	720	4.5	04 07	1.5	4.5	63.1	24.5	5.8	1.8			
42003	26.0N	086.0W	544	3.5	05 10	1.3	20.5	50.9	25.9	2.5				
44003	40.8N	068.5W	716	4.5	05 20	2.3	1.2	33.7	28.4	28.4	7.9			
44004	39.0N	070.0W	670	5.0	23 11	2.1	7.9	41.0	18.9	21.1	10.8			
44005	42.7N	068.3W	720	4.5	25 03	1.9	8.6	33.0	42.0	14.3	1.9			
44007	43.5N	070.1W	719	4.0	13 11	1.1	35.7	42.5	18.9	2.6	0.1			
44008	40.5N	069.4W	677	4.5	05 19	2.0	7.0	38.1	26.4	25.8	2.5			
45002	45.3N	086.3W	720	3.5	12 12	1.3	23.3	53.0	17.3	6.2				
45003	45.3N	082.8W	714	4.5	13 01	1.2	30.5	44.9	20.5	3.2	0.7			
45004	47.2N	086.5W	395	6.0	12 22	1.3	36.7	32.4	22.0	5.8	2.5	0.5		
45005	41.7N	082.5W	497	2.5	12 14	0.8	41.2	52.7	6.0					
45006	47.3N	090.0W	113	4.0	04 15	1.1	54.8	12.3	14.1	16.8	1.7			
45007	42.7N	087.1W	718	3.5	12 21	1.2	26.4	48.7	22.7	2.0				
45008	44.3N	082.4W	708	3.5	13 01	1.3	24.8	45.6	24.2	5.2				
46001	56.0N	148.0W	719	9.5	26 02	3.0		14.8	34.3	23.2	21.4	4.8	1.2	
46002	42.5N	130.0W	366	7.0	30 13	3.5		4.9	21.3	33.8	35.2	4.6		
46003	52.0N	156.0W	716	8.0	13 15	3.5		4.7	28.2	27.5	31.9	7.1	0.4	
46004	51.0N	136.0W	718	6.5	03 03	3.1		8.2	38.3	27.4	22.5	3.4		
46005	46.0N	131.0W	621	6.5	07 23	2.9		20.2	26.7	24.1	27.2	1.6		
46006	40.7N	137.7W	719	7.5	27 03	3.5		4.7	18.9	37.5	35.4	3.3		
46010	46.2N	124.2W	713	6.0	16 17	2.3	3.0	36.4	24.5	23.5	11.9	0.4		
46011	34.9N	120.9W	720	5.5	30 19	1.9	5.2	43.0	30.1	19.4	2.0			
46012	37.4N	122.7W	719	7.0	30 23	2.0	8.3	39.3	28.2	21.1	1.6	1.2		
46013	38.2N	123.3W	720	6.5	30 19	1.9	6.6	40.1	32.6	18.6	1.2	0.6		
46014	39.2N	124.0W	720	8.0	30 19	2.3	3.3	30.4	28.8	28.7	7.5	0.9	0.1	
46022	40.8N	124.5W	718	6.0	30 16	2.5	1.3	26.8	31.3	26.7	13.0	0.5		
46023	34.3N	120.7W	718	6.5	30 22	2.1	3.3	35.7	37.1	16.7	6.2	0.6		
46024	33.0N	119.2W	718	5.0	30 22	1.6	9.0	46.7	35.7	7.3	0.9			
46025	33.8N	119.3W	718	4.5	30 21	1.0	37.7	54.8	5.9	0.5	0.8			
46026	37.8N	122.7W	711	5.0	30 18	1.5	17.1	41.3	35.0	5.2	1.2			

NOVEMBER 1982 | TOTAL FREQUENCY OF WIND SPEEDS (%) | TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.7W		0.3	11.4	60.8	27.1	0.4		23.7	25.9	6.3	22.9	5.6	3.2	2.1	10.4
41002	32.3N	075.3W		0.7	19.1	78.9	1.3			18.1	35.7	17.5	7.7	19.2	7.8	4.8	2.4
41006	29.3N	077.7W		3.6	24.9	69.9	1.5			10.6	28.2	23.8	12.2	12.2	5.8	3.4	3.8
42001	25.9N	089.7W		2.6	32.5	53.8	11.0			18.0	31.1	20.7	20.9	10.0	0.3	0.2	0.8
42002	26.0N	093.5W		1.0	32.8	59.4	6.5	0.3		8.2	17.2	26.4	27.1	16.4	2.7	0.2	1.7
42003	26.0N	086.0W	0.1	0.3	30.4	61.9	7.1			10.4	24.9	28.3	19.0	8.6	1.7	0.3	1.9
42007	30.1N	088.9W		4.8	43.4	47.1	5.4			14.7	24.2	30.6	13.9	4.0	2.7	2.3	3.9
44003	40.8N	068.5W		3.1	29.3	62.3	5.3			12.9	13.1	6.8	2.5	20.2	14.8	12.2	17.4
44004	39.0N	070.0W		1.8	20.4	67.6	10.1			9.4	10.0	9.2	3.7	13.6	15.2	8.2	18.7
44005	42.7N	068.1W		1.5	14.6	56.2	27.7			11.1	6.2	9.6	5.5	17.1	20.2	10.6	13.6
44007	43.5N	070.1W		5.6	33.4	55.0	6.0			10.0	11.5	4.8	2.3	14.2	20.3	21.4	15.4
44008	40.5N	069.4W		1.9	22.8	67.1	8.3			13.5	10.4	7.5	4.3	18.5	16.8	13.0	15.9
44011	41.0N	066.6W		5.8	33.8	53.7	6.8			13.3	11.4	7.9	4.3	16.8	16.4	12.4	16.5
45002	45.3N	086.5W		3.8	34.6	58.8	2.8			11.5	3.5	8.3	4.3	14.1	19.2	20.6	18.6
45003	45.3N	082.8W		4.8	32.7	58.8	3.7			9.1	1.7	6.9	11.2	13.3	16.8	25.6	10.9
45004	47.2N	086.5W		7.9	40.8	47.2	4.1			14.4	9.0	9.5	6.8	9.1	18.7	19.2	14.3
45005	41.7N	082.5W		2.9	38.1	53.8	5.6			8.2	5.0	9.3	9.1	14.4	16.2	18.8	9.5
45006	47.3N	090.0W		15.5	42.7	32.0	9.7			32.0	27.9	7.5	0.7	15.5	9.7		6.6
45007	42.7N	087.1W		3.3	27.6	66.7	2.4			6.3	4.1	8.8	14.0	12.4	16.7	22.5	15.1
45008	44.3N	082.4W		2.4	36.7	54.0	6.9			5.8	3.7	5.7	6.3	19.9	23.0	21.9	13.8
46001	56.0N	148.0W		4.7	53.3	31.2	10.7			9.3	5.4	5.6	12.8	18.7	17.7	16.0	14.5
46002	42.5N	130.0W		0.8	17.1	58.0	24.1			11.0	8.8	13.6	6.9	12.0	10.7	18.5	18.5
46003	52.0N	156.0W		0.6	9.6	48.3	39.7	1.8		6.0	4.2	7.3	9.0	12.1	22.2	28.7	13.6
46004	51.0N	136.0W		3.4	14.7	58.6	22.0	1.4		9.8	6.4	3.2	11.7	20.3	14.9	22.4	10.5
46005	46.0N	131.0W		0.5	27.0	35.2	31.3	0.2		11.3	8.2	10.1	4.0	13.8	13.9	22.4	16.3
46006	40.7N	137.7W		3.6	13.5	40.7	38.4	3.8		8.7	3.0	8.8	8.6	14.9	13.1	25.1	17.8
46010	46.2N	124.7W		2.9	27.8	62.8	6.5			2.9	4.3	36.7	10.9	17.0	14.0	9.2	4.9
46011	34.9W	120.9W		13.5	53.7	29.9	2.9			17.0	14.8	5.8	11.0	5.9	6.9	10.4	28.2
46012	37.4N	122.7W		14.1	39.2	40.4	6.2	0.1		23.4	13.6	16.5	8.0	12.4	5.6	7.1	13.4
46013	38.2N	123.3W		10.1	40.5	40.1	9.1	0.3		6.6	4.9	34.1	7.7	6.7	6.6	8.8	24.7
46014	39.2N	124.0W		13.1	42.1	35.0	9.4	0.4		16.6	4.1	16.5	21.7	16.7	7.1	6.4	9.0
46016	63.3N	170.5W		6.1	28.8	50.1	15.0	0.2		11.6	7.6	10.6	14.5	6.6	3.5	9.9	16.4
46017	60.3N	172.3W		3.0	28.5	32.3	32.8	3.4		1.4	20.9	26.4	16.5	16.7	11.8	1.2	5.2
46018	60.3N	177.0W			19.1	41.9	36.0	3.0		10.0	43.0	11.1	5.9	9.1	10.1	6.4	4.4
46019	57.2N	170.3W		4.2	19.7	47.5	27.7	0.8		9.5	14.2	23.0	10.1	6.5	20.7	8.1	7.8
46020	55.9N	168.0W		0.4	21.8	45.0	29.0	3.8		11.4	21.1	13.2	11.1	11.2	9.8	14.9	7.4
46021	57.7N	160.0W		0.7	32.7	47.7	18.3	0.7		12.6	15.2	19.9	15.8	9.6	6.9	10.6	9.3
46022	40.8N	124.5W		9.6	45.9	41.8	2.6			17.3	5.0	4.3	30.5	21.4	12.1	4.6	4.7
46023	34.3N	120.7W		11.6	46.2	41.4	2.8			23.0	3.2	5.9	4.6	4.5	5.9	9.7	43.2
46024	33.0N	119.5W		13.0	52.3	31.2	3.2			10.7	5.9	1.9	0.3	2.1	8.3	20.5	50.4
46025	33.8N	119.3W		31.3	47.6	19.1	2.0			5.8	11.6	9.4	7.4	6.2	11.7	25.8	22.0
46026	37.8N	122.7W		8.0	40.3	48.9	2.8			3.7	22.8	30.9	2.8	6.2	7.0	8.5	18.2

NOVEMBER 1982 | % FREQUENCY OF WIND SPEEDS (<4 KTS) | % FREQUENCY OF WIND SPEEDS (4-10 KTS) | % FREQUENCY OF WIND SPEEDS (11-21 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.7W	0.3	<.05							0.8	4.3	2.2	1.9	0.5	<.05	0.3	1.4	17.4	13.7	3.0	13.8	2.3	3.1	1.3	6.1
41002	32.3N	075.3W			0.1	0.1	0.2			0.3	1.4	1.1	5.1	4.0	3.5	1.4	2.2	0.4	16.4	34.0	12.3	3.7	10.5	6.3	2.3	1.5
41006	29.3N	077.7W	0.8	0.3	0.3		0.2	0.2	0.7	1.2	3.5	1.2	3.1	4.4	5.4	2.7	2.4	1.5	25.4	30.2	8.1	6.6	1.9	0.9	0.4	1.1
42001	25.9N	089.7W		0.1	1.6	0.5	0.3	<.05	0.1		1.3	6.3	11.4	9.8	3.3	0.2	0.1	<.05	1.9	21.0	7.6	16.4	6.4	0.1		0.4
42002	26.0N	093.5W			0.3	0.3	0.1	0.2		0.1	2.1	2.0	8.0	11.4	5.7	1.6	0.2	0.7	2.3	12.2	10.0	15.3	9.9	1.0		0.8
42003	26.0N	086.0W					0.1	0.1			0.6	1.6	15.6	8.9	3.1	0.9	0.1		7.0	20.2	22.7	10.0	3.6	0.7		1.6
42007	30.1N	088.9W		0.6	2.2	0.6	0.4	0.2			2.2	8.6	17.4	8.3	2.2	0.2	0.1	1.3	8.0	17.4	8.1	14.8	4.9	1.4	0.6	0.4	0.9
44003	40.8N	068.5W		0.8	1.1	0.2	0.1	0.6	0.3		3.7	3.5	3.0	1.4	5.7	7.2	2.5	2.3	8.4	8.8	2.7	0.9	11.3	0.6	0.9	0.4	13.1
44004	39.0N	070.0W	0.3	0.5	0.5	0.2		0.3		0.1	2.5	2.5	2.7	3.1	2.4	3.1	1.7	2.4	10.1	13.3	5.3	5.6	0.4	10.1	10.2	5.6	12.3
44005	42.7N	068.1W	0.2	0.3		0.6					0.2	0.2	2.0	1.4	2.4	1.0	2.8	2.5	1.7	0.9	6.1	4.5	7.2	3.1	6.4	9.1	8.8	9.7
44007	43.5N	070.1W	0.5	0.4	0.7	0.4	1.4	0.8	0.8	0.6	5.1	7.5	3.4	1.4	3.9	5.0	3.2	3.7	9.4	3.2	6.1	0.7	0.1	4.7	13.3	13.6	9.1
44008	40.5N	069.4W	0.3	0.1	0.6	0.3	0.1	0.5	0.1		2.4	2.6	2.7	1.2	1.3	3.4	5.6	2.7	2.1	10.5	7.6	4.2	2.7	13.4	9.8	9.4	9.5
45001	48.0N	087.6W	0.3	1.4	1.6		0.4	0.7	1.1	0.3	4.5	2.6	3.0	1.8	2.6	5.5	7.6	4.8	5.6	7.1	3.3	2.5	2.8	9.3	12.9	10.2
45002	45.3N	086.5W	1.2		0.1	0.4	0.1	0.6	1.0	0.3	4.6	2.7	4.6	1.9	5.9	4.0	6.0	4.8	5.8	8.8	3.5	3.9	7.4	13.8	12.9	10.8
45003	45.3N	082.8W	1.5	0.2	0.1	0.1	0.1	0.7	0.4	1.8	1.2	4.4	6.0	5.0	5.3	7.8	2.2	0.7	0.4	3.9	5.0	5.2	11.3	19.4	18.2	9.5
45004	47.2N	086.5W	0.6	1.3	1.0	0.8	0.6	1.6	0.5	1.4	3.2	7.1	6.1	3.8	2.6	8.5	7.1	2.9	8.3	0.6	2.4	4.6	0.9	7.8	11.7	10.9
45005	41.7N	082.5W	0.1	0.3	0.5	0.9	0.5	0.5	0.3	0.2	1.2	3.8	4.8	6.3	6.9	9.4	3.4	2.7	0.9	1.3	4.0	2.2	6.5	23.5	11.2	3.6
45006	47.3N	090.0W	1.9	2.9	1.7	0.2	3.2	3.6		1.9	3.6	19.9	5.1	0.3	4.8	5.8		1.2	18.9	2.9	0.7	0.2	5.6	0.2		3.4
45007	42.7N	087.1W	0.7	0.4	0.1	0.3	0.2	0.5	0.5	0.5	2.5	1.1	1.9	1.3	5.7	2.9	5.1	5.0	3.2	3.1	1.4	0.7	7.9	15.2	11.6	4.1	9.9
45008	44.3N	082.4W	0.4	0.2	0.1	0.2	0.4	0.6	0.6		3.1	3.5	4.5	1.9	7.7	6.4	6.5	3.1	2.3	10.5	1.1	0.2	11.7	19.4	5.8	10.7	9.5
46001	56.0N	148.0W	0.4		0.3	0.3	1.2	1.0	1.0	0.6	1.2	0.4	0.9	2.6	5.0	8.4	4.5	9.6	2.8	0.7	3.1	6.2	9.7	8.0	9.1	11.5
46002	42.5N	130.0W	0.1		0.1	<.05		0.1			2.4	2.4	4.3	2.7	3.0	4.1	4.8	4.7	5.1	5.7	5.3	0.8	7.1	11.4	9.9	10.9
46003	52.0N	156.0W	0.1	0.1	0.1		0.1				0.4	0.6	0.5	0.9	0.4	2.6	2.2	2.3	3.2	2.9	2.1	0.4	11.7	12.3	10.8	5.6
46004	51.0N	136.0W	0.1	0.2	0.2	0.3	1.0	0.7	0.3	0.6	0.9	2.0	0.3	0.5	2.2	3.0	3.0	2.7	7.0	3.1	2.5	5.9	11.2	6.1	9.9	8.0	9.6
46005	46.0N	131.0W	1.1	0.7	0.9	0.6	0.2	0.9	1.1	0.8	5.1	4.7	4.6	2.2	1.7	2.1	3.4	3.3	4.1	1.1	2.6	1.1	5.9	6.1	9.1	9.2
46006	40.7N	137.7W	0.5	0.8	0.4	<.05	0.1	0.2	0.1	0.1	1.3	2.2	1.5	0.3	1.1	2.1	1.1	0.1	3.1	5.0	0.8	0.3	4.3	0.9	4.1	5.4	4.0
46010	46.2N	124.2W	0.3	0.4	0.4	1.1	0.4	0.2	0.5	0.1	0.4	2.4	3.3	9.0	3.5	1.1	2.6	3.4	2.5	0.4	0.6	24.9	6.6	11.1	6.0	5.6	2.3
46011	34.9W	120.9W	2.9	2.8	2.1	1.6	0.1	0.6	1.1	2.2	11.3	9.1	3.7	6.8	2.8	1.6	6.6	12.0	2.8	2.9	0.1	2.4	3.0	4.0	1.8	12.9
46012	37.4N	122.7W	2.4	2.6	3.8	1.6	1.6	0.3	0.7	1.3	10.0	6.3	8.1	2.9	1.6	3.2	2.3	0.7	10.8	4.8	4.5	2.6	7.0	1.8	3.4	5.6
46013	38.2N	123.3W	1.4	1.1	1.6	0.7	1.1	1.7	3.4	1.7	3.9	2.9	11.4	3.1	2.7	3.0	2.4	0.9	16.5	3.1	2.4	1.1	3.0	2.4	3.1	5.4
46014	39.2N	124.0W	0.9	1.4	2.6	3.1	1.7	1.4	1.5	0.6	5.4	2.6	13.3	10.5	3.4	2.2	2.3	2.4	7.6	0.1	0.6	7.1	0.5	3.0	3.9	4.1
46016	63.3N	170.5W	0.3	1.4	0.3	2.8	0.8	0.4			4.4	5.1	6.6	4.4	2.6	2.1	2.0	1.7	4.6	9.1	5.1	6.0	2.1	1.0	1.5	2.7
46017	60.3N	172.3W			0.4	0.5	0.3	0.4		1.3	1.0	3.0	6.4	5.7	5.5	3.5	0.4	3.5	5.6	7.6	7.2	6.8	0.7	0.4		
46018	60.3N	177.0W									2.6	5.9	1.8	1.5	2.0	1.2	2.4	0.4	1.9	14.9	7.1	1.7	4.3	2.0	3.9	4.0
46019	57.2N	170.3W			0.5	1.5	1.8			0.4	2.2	1.8	2.1	5.6	1.6	4.0	0.6	1.9	4.2	14.8	2.5	1.9	10.6	6.5	2.5	
46020	55.9N	168.0W			0.4						2.7	3.6	6.5	1.7	1.5	1.5	2.7	1.9	5.7	12.1	5.4	0.6	4.4	3.6	6.5	2.7
46021	57.7N	160.0W	0.5	0.2							1.9	3.6	5.9	3.3	2.7	2.8	2.8	2.8	10.6	6.9	3.4	5.1	6.7	5.2		
46022	40.8N	124.5W	0.9	1.2	1.9	2.0	1.2	1.0	0.6	0.9	5.6	3.3	2.1	10.4	1.5	3.0	1.8	2.5	10.8	0.5	0.3	10.1	10.2	6.9	1.6	1.3
46023	34.3N	120.7W	2.4	1.3	1.5	0.7	1.0	0.3	1.7	2.6	11.3	1.9	3.2	2.2	1.6	1.9	4.8	17.3	9.0		1.2	1.7	2.8	3.5	2.3	21.4
46024	33.0N	119.2W	1.7	0.5	0.4	<.05	0.5	0.4	0.5	0.8	4.4	5.0	1.5	0.3	0.5	2.7	1.4	9.2	4.9	0.5	0.4		0.7	4.5	5.8	19.5
46025	33.8N	119.3W	2.2	1.5	2.3	3.6	2.5	1.1	1.1	0.8	3.2	2.3	5.1	5.1	4.4	3.8	2.3	3.1	11.2	4.4	0.4	1.0	4.4	5.1	2.9	9.1
46026	37.8N	122.7W	1.4	2.0	1.4	0.4	0.3	0.7	0.9	0.9	1.8	8.9	13.4	1.3	1.5	3.4	2.6	7.8	0.4	11.9	16.0	1.1	4.0	2.6	3.9	8.9

NOVEMBER 1982 | % FREQUENCY OF WIND SPEEDS (22- 33 KTS) | % FREQUENCY OF WIND SPEEDS (34-47 KTS) | % FREQUENCY OF WIND SPEEDS (>47 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.7W	5.2	7.9	1.1	6.9	2.8		0.4	2.9				0.3			0.1	<.05								
41002	32.3N	075.3W	0.2	0.6				0.1		0.3																
41006	29.3N	077.7W		1.4	0.1	<.05																				
42001	25.9N	089.7W	6.8	3.6	0.1	0.1				0.3																
42002	26.0N	093.5W	3.5	2.2	0.1	0.1	0.6			0.2								<.05								
42003	26.0N	086.0W	2.7	0.1						0.2																
42007	30.1N	088.9W	4.6	0.2						0.7																
44003	40.8N	068.5W	0.7				1.4	0.1	1.1	1.9																
44004	39.0N	070.0W	1.5	0.7	0.4		1.1	1.7	0.8	3.9																
44005	42.7N	068.1W	2.8				0.7	0.9	0.4	5.2																
44007	43.5N	070.1W	0.1				2.2	1.2	1.4	1.0																
44008	40.5N	069.4W	0.4	0.1		<.05	1.6	1.1	0.8	4.3																
45001	48.0N	087.6W	0.9	0.3				0.9	0.8	4.0																
45002	45.3N	086.5W					0.4	0.2	0.3	0.7																
45003	45.3N	082.8W					0.1	<.05	2.5	1.0																
45004	47.2N	086.5W	2.3					0.8		1.0																
45005	41.7N	082.5W					0.5	3.2	1.9																	
45006	47.3N	090.0W	7.5	2.2																						
45007	42.7N	087.1W						0.2	0.6	1.6																
45008	44.3N	082.4W					0.1	1.4	4.2	1.2																
46001	56.0N	148.0W		0.3	2.3	3.7	2.0	2.0	1.3	0.9																
46002	42.5N	130.0W	3.8	1.8	3.4		2.8	2.7	4.4	5.2																
46003	52.0N	156.0W	2.2	0.6	4.6	3.9	3.5	7.1	12.0	5.9				0.1	0.7	0.2	0.7	<.05								
46004	51.0N	136.0W	1.7			3.9	4.5	1.3	5.0	5.8				1.4												
46005	46.0N	131.0W	1.0	1.7	2.0	0.2	5.7	4.8	8.8	7.0					0.2											
46006	40.7N	137.7W	2.9	0.3	1.2	2.7	5.6	4.2	14.9	6.5	0.1				0.4	0.1	1.8	1.9								
46010	46.2N	124.2W			1.8	0.2	4.0	0.3	0.1																	
46011	34.9W	120.9W				0.1		0.8	0.9	1.1																
46012	37.4N	122.7W	0.2			1.0	2.4	1.0	0.6	1.8								0.1								
46013	38.2N	123.3W	0.1		1.2	0.5	0.4	0.9	0.3	5.7							0.1	0.2								
46014	39.2N	124.0W	2.7			1.0	3.0	0.5	0.6	1.5								0.4								
46016	63.3N	170.5W	2.0	15.3	2.8	3.3	1.1		0.9	0.4	0.3	4.7	1.7				0.4									
46017	60.3N	172.3W	0.4	10.3	11.4	3.2	3.2	1.1				2.6	0.4			0.4										
46018	60.3N	177.0W	5.3	21.2	1.5	1.5	2.8	3.8				1.0	0.7	1.3												
46019	57.2N	170.3W	3.0	8.0	5.8	0.9	1.6	4.3	1.2	2.9				0.3	0.3											
46020	55.9N	168.0W	3.0	9.7	0.9	2.7	4.1	4.3	5.7	2.3				0.4	1.7	1.3	0.4									
46021	57.7N	160.0W			3.6	5.8	3.1	1.6	2.6					0.2	0.3											
46022	40.8N	124.5W					1.5	0.5	0.6	0.3																
46023	34.3N	120.7W	0.4					0.2	0.8	1.6																
46024	33.0N	119.2W					0.3	0.7	1.3	0.9																
46025	33.8N	119.3W						0.5	1.1	0.4																
46026	37.8N	122.7W			0.1		0.5	0.2	1.0	1.0																

DECEMBER 1982			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.7N	072.7W	062	03	21.6	31 15	16.2	30 19	19.7	062	03	21.7	31 21	20.5	29 14	20.9	062	03	00.7	29 23	-04.0	30 19	-01.1
41002	32.3N	075.3W	744	31	24.5	02 15	12.8	13 17	20.1	744	31	25.5	12 02	21.9	28 21	23.7	744	31	00.6	31 15	-12.1	13 19	-03.6
41006	29.3N	077.3W	744	31	25.5	07 17	16.1	13 22	22.2	744	31	26.0	07 17	23.4	24 07	24.6	744	31	00.1	06 19	-08.2	13 20	-02.4
42001	25.9N	089.7W	743	31	26.3	03 14	17.0	13 05	23.3	744	31	27.2	01 19	25.1	28 17	26.0	744	31	-00.3	25 15	-09.0	13 04	-02.8
42002	26.0N	093.5W	744	31	27.2	03 15	16.0	13 04	22.9	744	31	26.6	05 21	23.6	29 [illegible]	[illegible]	744	31	01.4	25 15	-10.0	13 04	-02.5
42003	26.0N	086.0W	740	31	26.8	01 16	17.4	13 10	23.6	741	31	27.0	01 02	25.3	30 11	[illegible]	741	31	00.1	01 16	-08.9	13 10	-02.6
42007	30.1N	088.9W	743	31	22.3	03 20	02.1	13 09	15.9														
42008	28.7N	095.3W	742	31	23.3	02 18	02.1	12 14	15.6														
42011	29.6N	093.5W	247	11	22.3	27 10	06.3	29 14	15.5														
44003	40.8N	068.5W	707	31	15.2	06 23	00.0	10 03	08.7	744	31	11.6	01 06	09.7	23 23	10.6	744	31	03.8	06 23	-11.2	10 03	-02.3
44004	39.0N	070.0W	733	31	20.3	06 15	00.2	13 18	12.6	732	31	21.1	16 17	16.6	11 08	18.4	738	31	01.6	06 18	-19.3	13 18	-05.9
44005	42.7N	068.3W	648	30	14.2	06 16	00.0	18 10	06.9	739	31	09.6	03 21	07.6	23 09	08.5	741	31	04.6	06 16	-08.5	09 18	-02.4
44007	43.5N	070.1W	489	25	16.5	04 20	00.0	09 14	06.1	723	31	09.8	06 19	07.0	29 36	08.4	744	31	06.9	04 20	-09.2	09 16	-04.1
44008	40.5N	069.4W	692	31	16.6	07 00	00.0	12 22	08.7	734	31	13.5	01 08	08.9	30 22	11.1	737	31	04.4	29 11	-12.5	10 02	-02.8
45002	45.3N	086.3W	036	02	10.1	02 11	06.3	01 00	08.0	036	02	09.3	02 11	07.4	01 02	07.7	036	02	01.6	02 06	-01.2	01 00	00.2
45003	45.3N	082.8W	015	01	07.9	01 07	06.2	01 00	07.2	015	01	07.1	01 14	06.8	01 05	07.0	015	01	00.9	01 07	-00.8	01 00	00.2
45005	41.7N	082.5W	075	04	14.4	03 12	08.4	01 00	10.7	075	04	06.7	01 20	06.2	01 00	06.5	075	04	07.9	03 12	02.2	01 00	04.2
45007	42.7N	087.1W	169	08	12.0	02 20	00.0	08 04	07.0	185	08	06.8	01 04	06.2	08 04	06.6	185	08	05.4	02 20	-06.3	07 14	-00.2
46001	56.0N	148.0W	704	31	07.2	07 04	00.0	01 10	04.7	744	31	06.1	01 03	05.2	30 13	05.6	744	31	01.4	07 04	-06.0	01 10	-01.1
46002	42.5N	130.0W	740	31	14.2	03 10	05.6	21 15	10.7	742	31	12.8	01 01	10.4	31 12	11.6	742	31	02.3	15 19	-05.6	21 15	-00.9
46003	52.0N	156.0W	733	31	07.3	28 18	00.1	02 21	03.9	744	31	06.6	05 01	05.3	29 19	06.0	744	31	01.7	28 18	-06.1	02 13	-02.1
46004	51.0N	136.0W	741	31	09.2	11 17	02.2	04 04	07.0	743	31	08.5	01 01	07.1	28 00	07.7	743	31	01.3	13 11	-05.9	04 04	-00.8
46005	46.0N	131.0W	367	16	10.4	25 00	05.5	22 12	08.1	367	16	11.8	16 18	10.4	29 12	10.9	367	16	-00.5	25 00	-05.4	19 19	-02.9
46006	40.7N	137.7W	741	31	19.7	03 05	10.5	21 04	15.4	741	31	13.1	01 01	11.3	29 17	12.3	741	31	06.6	03 05	-01.3	21 04	03.1
46010	46.2N	124.2W	741	31	13.3	03 14	03.4	29 12	08.2	738	31	11.9	03 18	08.0	29 23	10.8	741	31	01.6	03 14	-07.1	29 12	-02.7
46011	34.9N	120.9W	744	31	17.1	10 00	09.3	25 15	13.8	744	31	16.1	01 02	13.7	09 15	15.2	744	31	02.7	09 16	-05.4	25 15	-01.4
46012	37.4N	122.7W	744	31	16.0	08 23	09.1	31 16	12.8	744	31	15.4	01 01	12.5	26 22	13.8	744	31	02.2	08 23	-04.5	02 17	-01.0
46013	38.2N	123.3W	743	31	17.7	08 23	07.6	31 15	12.0	743	31	14.2	01 12	11.5	20 12	13.3	743	31	04.2	08 23	-05.7	23 17	-01.3
46014	39.2N	124.0W	744	31	14.4	22 20	07.4	29 16	12.0	744	31	14.7	05 23	12.7	30 12	13.6	744	31	00.7	21 20	-05.6	23 18	-01.7
46017	60.3N	172.3W	021	04	01.9	09 15	00.1	08 00	00.8														
46018	60.3N	177.0W	050	11	02.1	06 18	00.0	09 06	01.0														
46019	57.2N	170.3W	103	19	04.0	09 21	00.1	08 12	01.2														
46020	55.9N	168.0W	188	28	04.8	09 18	00.0	05 12	02.1	246	31	05.1	01 09	03.8	24 18	04.4	233	30	00.1	09 18	-04.7	05 12	-02.6
46022	40.8N	124.5W	743	31	15.1	04 03	07.1	24 16	11.6	743	31	14.2	06 02	11.4	26 04	12.9	743	31	01.7	16 02	-05.6	01 16	-01.3
46023	34.3N	120.7W	742	31	17.5	10 22	10.7	25 11	14.4	743	31	16.4	01 02	14.7	27 06	15.4	743	31	01.8	09 18	-04.9	01 15	-01.0
46024	33.0N	119.2W	743	31	18.0	05 23	12.1	24 13	14.9	743	31	17.7	03 21	15.6	29 04	16.4	743	31	01.2	09 15	-04.9	01 15	-01.5
46025	33.8N	119.3W	742	31	18.1	09 15	11.2	01 09	15.0	742	31	16.4	01 01	14.7	25 14	15.4	742	31	03.0	09 15	-04.9	01 09	-00.4
46026	37.8N	122.7W	741	31	16.6	08 21	06.0	31 16	11.3	741	31	14.2	01 02	10.7	30 13	12.6	741	31	04.0	08 21	-05.5	31 16	-01.3

DECEMBER 1982			PRESSURE (MB)							WIND SPEEDS (KNOTS)			MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.7N	072.3W	062	03	1025.4	30 15	1018.3	29 21	1021.2	061	29	29 20	210		21.2	17.4	10.2	23.0	21.1	6.6	6.9	19.1
41002	32.3N	075.3W	744	31	1032.3	25 15	999.5	12 18	1021.8	738	29	12 14	220	17.2	12.9	10.4	9.4	12.7	13.1	16.1	15.7	13.1
41006	29.3N	077.3W	744	31	1029.7	25 16	1003.9	12 20	1021.7	737	26	20 06	270	16.7	12.0	12.7	12.7	12.0	17.8	16.4	13.8	13.3
42001	25.9N	089.7W	744	31	1026.0	17 15	1009.9	04 20	1018.1	742	28	12 09	330	18.5	15.7	11.3	16.5	13.2	12.1	11.7	18.0	15.5
42002	26.0N	093.5W	744	31	1028.0	17 16	1005.7	24 20	1017.4	741	29	12 06	340	16.5	14.7	14.6	17.9	17.8	12.8	12.8	16.7	16.4
42003	26.0N	086.0W	741	31	1024.1	08 16	1009.7	12 10	1018.6	732	26	27 11	110	12.4	13.9	16.3	16.7	13.2	11.7	8.1	15.7	15.0
42007	30.1N	088.9W	743	31	1029.1	09 04	1007.7	11 23	1019.4	741	29	12 06	310	13.8	12.3	13.2	12.2	10.7	10.6	10.1	14.9	12.7
42008	28.7N	095.3W	743	31	1029.7	09 16	1002.6	24 21	1017.9	737	33	11 22	340	16.8	17.2	11.5	12.7	12.5	9.2	11.8	16.4	14.3
42011	29.6N	093.5W	247	11	1025.9	29 16	1004.9	24 21	1016.0	245	28	27 03	080	15.2	15.7	19.7	13.2	10.6	14.1	14.1	12.7	14.3
44003	40.8N	068.5W	744	31	1035.9	08 15	995.9	20 19	1020.7	743	30	12 17	030	15.5	17.0	6.9	8.2	12.2	13.7	11.2	12.4	13.1
44004	39.0N	070.0W	734	31	1036.4	08 15	998.7	20 18	1021.5	736	34	12 22	020	16.7	16.2	9.9	8.4	14.9	14.8	15.0	15.2	14.9
44005	42.7N	068.3W	739	31	1037.4	08 15	996.6	20 19	1020.6	739	34	09 18	340	19.6	18.8	12.4	12.4	17.3	19.7	16.6	17.7	18.0
44007	43.5N	070.1W	744	31	1038.1	08 15	998.3	21 06	1020.7	740	29	16 22	200	13.4	12.5	8.4	8.3	13.7	14.9	12.9	11.2	12.8
44008	40.5N	069.4W	736	31	1036.6	08 15	997.3	20 18	1021.0	733	36	12 15	020	17.1	16.5	8.5	9.0	13.3	14.4	14.5	13.6	14.2
45002	45.3N	086.3W	036	02	1017.2	02 05	1009.2	01 04	1013.6	036	15	02 09	110			10.2	8.2	5.8	8.4	8.5		08.0
45003	45.3N	082.8W	015	01	1014.5	01 13	1011.3	01 07	1013.2	015	18	01 02	130				13.1	10.9	8.5			10.4
45005	41.7N	082.5W	075	04	1023.7	02 16	1013.2	04 02	1018.2	074	18	03 12	200				8.9	8.0	11.6			09.4
45007	42.7N	087.1W	185	08	1038.6	08 04	993.8	05 21	1016.6	185	22	06 09	320	8.9	7.7	9.7	10.3	9.5	14.6	13.8	14.4	10.9
46001	56.0N	148.0W	744	31	1021.5	09 16	984.9	15 18	993.3	739	29	07 05	170	9.0	12.5	10.1	16.8	17.1	13.7	11.5	11.1	15.3
46002	42.5N	130.0W	742	31	1032.9	07 18	983.0	16 03	1013.6	729	37	16 05	230	11.4	12.0	13.5	14.1	19.6	19.2	19.0	18.4	16.6
46003	52.0N	156.0W	744	31	1016.9	09 09	956.6	14 00	990.1	744	45	28 23	160	20.1	23.9	23.6	25.2	24.2	19.8	22.9	22.6	22.6
46004	51.0N	136.0W	741	31	1036.2	27 23	970.9	14 12	1006.6	740	47	25 06	340	14.5	11.8	11.3	20.1	18.9	17.7	17.8	15.9	17.8
46005	46.0N	131.0W	366	16	1030.9	28 07	978.1	21 02	1012.1	365	50	18 19	270	15.0	15.6	15.1	16.2	17.3	20.8	22.2	13.3	18.5
46006	40.7N	137.7W	740	31	1028.4	07 09	976.0	15 21	1013.3	741	57	15 22	250	16.0	17.5	18.5	19.5	22.1	25.2	24.8	20.7	22.0
46010	46.2N	124.2W	741	31	1036.0	07 18	983.0	22 02	1015.2	737	37	16 03	180	8.5	8.1	14.3	14.6	20.1	18.7	9.8	9.8	15.1
46011	34.9N	120.9W	744	31	1026.7	16 07	1001.6	01 00	1017.5	722	29	01 04	300	11.8	9.9	5.2	7.1	11.5	11.4	7.7	14.2	11.1
46012	37.4N	122.7W	744	31	1030.8	24 17	993.2	22 22	1019.1	707	34	22 22	220	12.2	11.3	8.6	8.9	17.2	12.0	8.4	15.7	12.6
46013	38.2N	123.3W	741	31	1032.3	24 17	990.8	22 21	1019.0	725	37	23 00	300	8.8	5.9	8.6	8.9	17.5	10.5	7.9	14.0	11.2
46014	39.2N	124.0W	741	31	1032.9	24 19	990.6	22 23	1018.7	729	37	23 00	320	12.3	5.4	6.1	10.1	17.3	11.7	7.1	16.9	12.5
46016	63.3N	170.3W	248	31	1030.7	31 21	972.1	13 09	999.0	244	35	10 03	120	15.7	19.3	14.1	16.8	15.4	12.0	8.5	13.5	16.9
46017	60.3N	172.3W	244	31	1028.0	31 21	970.6	13 12	994.4	244	36	19 09	110	11.7	19.4	18.2	18.9	20.2	12.4	15.0	9.1	17.2
46018	60.3N	177.0W	247	31	1030.1	31 21	968.4	07 18	994.5	246	37	07 06	120	18.4	18.1	18.0	22.6	15.3	12.4	16.6	18.2	18.2
46019	57.2N	170.3W	243	31	1022.7	31 21	960.1	19 09	992.5	245	36	09 21	180	16.1	15.5	14.0	17.0	13.3	7.4	12.4	18.0	14.9
46020	55.9N	168.0W	244	31	1018.4	02 06	960.0	19 15	990.5	246	43	19 03	120	14.1	13.6	13.0	20.3	16.6	15.6	17.4	18.3	15.7
46022	40.8N	124.5W	743	31	1034.1	24 17	992.9	22 22	1017.4	734	40	16 06	170	12.9	6.4	4.9	8.8	18.2	14.3	11.9	15.0	13.5
46023	34.3N	120.7W	743	31	1026.4	16 07	1002.7	01 00	1017.2	685	29	01 04	310	15.7	7.2	5.4	8.8	10.7	9.3	4.7	15.5	13.7
46024	33.0N	119.2W	743	31	1025.6	16 06	1003.3	09 22	1016.4	652	34	01 02	310	10.9	15.3	9.6	5.6	5.6	10.0	3.4	15.2	12.2
46025	33.8N	119.3W	742	31	1026.2	16 06	1002.9	01 00	1017.0	720	30	08 14	040	10.6	11.4	5.2	4.3	5.1	7.0	6.7	12.0	09.0
46026	37.8N	122.7W	741	31	1031.7	24 17	990.5	22 23	1019.3	731	35	23 00	290	9.1	9.5	8.9	12.0	17.3	12.8	9.8	13.7	11.2

DECEMBER 1982			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.7N	072.7W	062	3.5	29 19	2.5			62.9	37.0				
41002	32.3N	075.3W	740	7.0	13 03	2.1	1.7	42.5	32.2	12.8	9.8	0.6		
41006	29.3N	077.3W	743	4.5	13 03	2.2		26.9	54.9	12.3	5.7			
42001	25.9N	089.7W	744	4.0	12 15	1.7	9.6	39.3	44.2	6.5	0.1			
42002	26.0N	093.5W	744	4.5	12 18	1.9	4.5	36.1	48.4	10.1	0.6			
42003	26.0N	086.0W	619	3.5	13 08	1.7	9.8	38.4	43.6	8.8				
44003	40.8N	068.5W	744	6.5	13 01	2.3	0.8	44.8	24.8	15.3	10.4	3.6		
44004	39.0N	070.0W	696	7.5	13 00	2.1	11.6	38.7	21.1	11.6	14.7	2.0		
44005	42.7N	068.3W	736	5.0	18 01	1.9	6.1	41.8	30.1	12.7	9.3			
44007	43.5N	070.1W	742	3.5	16 23	1.1	33.9	49.1	13.8	2.9				
44008	40.5N	069.4W	695	6.0	13 00	1.9	9.3	44.7	22.3	15.1	8.0	0.4		
45002	45.3N	086.3W	036	1.0	01 00	0.5	72.2	27.7						
45003	45.3N	082.8W	015	1.0	01 02	0.8	26.6	73.3						
45007	42.7N	087.1W	185	2.5	06 02	0.9	51.8	37.2	10.8					
46001	56.0N	148.0W	743	9.5	07 10	4.0		3.3	20.9	21.5	40.3	12.2	1.4	
46002	42.5N	130.0W	737	11.0	16 05	3.8		18.8	14.7	21.0	29.3	10.5	4.6	0.8
46003	52.0N	156.0W	743	11.5	29 00	4.6		0.8	5.7	22.8	51.2	14.9	2.9	1.3
46004	51.0N	136.0W	739	10.5	15 08	3.9		0.2	21.3	30.9	34.5	10.9	1.2	0.6
46005	46.0N	131.0W	361	9.0	18 20	3.8		14.6	17.7	16.6	33.5	14.4	3.0	
46006	40.7N	137.7W	736	11.5	15 22	4.3		0.9	23.5	21.8	33.8	12.2	6.3	1.2
46010	46.2N	124.2W	736	10.0	19 03	3.2	1.6	30.5	13.7	22.2	18.7	9.5	3.3	0.1
46011	34.9N	120.9W	743	7.5	01 06	2.7	6.3	31.8	20.3	14.1	19.9	7.4		
46012	37.4N	122.7W	743	7.5	23 01	2.6	4.7	32.3	21.9	17.0	20.0	3.9		
46013	38.2N	123.3W	741	7.0	01 03	2.6	6.3	33.1	19.4	17.4	19.7	3.9		
46014	39.2N	124.0W	742	8.5	16 18	3.1	2.4	27.8	16.3	21.1	20.8	10.7	0.5	
46022	40.8N	124.5W	741	8.5	16 17	3.3	0.1	24.4	20.1	17.9	26.3	9.5	1.4	
46023	34.3N	120.7W	743	8.0	01 07	3.0	0.5	30.1	21.3	18.5	18.5	10.4	0.2	
46024	33.0N	119.2W	743	6.5	01 12	2.3	6.5	34.7	25.7	13.4	18.9	0.5		
46025	33.8N	119.3W	742	4.5	01 05	1.5	17.6	51.6	19.5	7.2	3.9			
46026	37.8N	122.7W	732	5.5	01 01	2.0	15.4	36.0	22.1	12.4	13.9			

DECEMBER 1982 | TOTAL FREQUENCY OF WIND SPEEDS (%) | TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY	LAT	LONG	CALM	<1KT	1-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.7W		4.9	9.8	44.3	41.0				15.6	10.7	2.0	35.7	21.7	7.4	7.0
41002	32.3N	075.3W		3.0	36.2	49.3	11.5			12.1	10.5	8.6	12.7	30.8	12.3	5.7	7.4
41006	29.3N	077.3W		3.0	20.1	72.7	4.2			5.2	6.9	23.6	29.9	15.1	4.2	6.3	8.8
42001	25.9N	089.7W		2.6	15.6	71.3	10.5			13.1	21.5	10.5	36.8	10.0	3.9	1.9	2.3
42002	26.0N	093.5W		0.9	18.6	64.0	16.7			15.2	21.8	9.4	25.0	18.0	2.0	1.1	6.8
42003	26.0N	086.0W	0.1	4.9	13.4	76.6	5.1			8.2	13.0	27.4	28.2	6.5	2.9	4.4	9.7
42007	30.1N	088.9W		2.3	24.7	70.6	2.4			16.2	19.4	23.7	17.0	4.6	7.0	4.9	9.2
42008	28.7N	095.3W	0.3	2.6	29.2	53.5	14.6			20.4	16.6	7.3	19.4	12.4	4.7	8.2	10.8
42011	29.6N	093.5W			20.0	71.8	8.2			16.6	17.0	5.9	23.2	4.9	1.5	9.4	1.9
44003	40.8N	068.5W		3.8	34.1	51.3	10.9			12.8	14.5	4.3	5.9	17.4	17.8	10.9	16.4
44004	39.0N	070.0W		4.9	24.2	51.5	19.3	0.1		20.4	13.4	6.5	4.6	10.2	17.1	14.5	13.3
44005	42.7N	068.5W		3.4	13.5	48.8	34.0	0.3		12.3	16.4	2.9	4.9	12.8	24.5	14.9	11.3
44007	43.5N	070.1W		6.4	27.4	62.0	4.2			18.6	9.1	4.6	4.0	5.7	22.2	20.6	15.2
44008	40.5N	069.4W		3.4	27.8	53.9	14.1	0.8		16.6	13.6	4.5	5.6	16.8	15.6	10.8	16.4
45002	45.3N	086.7W			77.8	22.2							13.9	20.8	22.9	38.2	4.2	
45003	45.3N	082.8W			46.7	53.3								35.0	11.7	53.3		
45005	41.7N	082.5W		1.4	62.2	36.5								17.2	62.6	19.9		
45007	42.7N	087.1W		1.6	52.4	44.9	1.1			10.3	19.6	4.1		19.3	19.6	7.3	11.5	13.4
46001	56.0N	148.0W		3.9	18.5	58.3	19.2			1.3	9.1	14.5		16.5	27.9	16.7	6.9	7.1
46002	42.5N	130.0W		1.6	16.5	58.7	22.5	0.7		7.3	13.8	14.8		2.6	17.6	17.9	15.0	10.9
46003	52.0N	156.0W		0.5	8.7	34.1	49.1	7.5		7.1	6.0	7.1		7.6	12.2	15.6	29.0	15.4
46004	51.0N	136.0W		1.0	8.8	51.5	29.5	9.2		4.8	7.0	7.5		10.5	26.4	16.6	16.4	9.8
46005	46.0N	131.0W		1.9	18.1	43.3	32.3	4.1	0.3	3.3	15.1	9.1		4.8	17.7	24.0	22.6	3.4
46006	40.7N	137.7W		0.1	4.6	46.3	42.0	6.5	0.5	3.8	5.7	8.1		14.4	19.2	18.8	22.9	7.1
46010	46.2N	124.2W		2.2	20.6	63.4	13.6	0.3		3.5	7.2	33.2		9.3	20.8	15.2	3.1	7.7
46011	34.9N	120.9W		11.2	39.3	41.6	7.9			27.8	13.1	6.4		12.3	8.2	2.5	1.9	27.8
46012	37.4N	122.7W		9.5	35.6	37.1	17.7	0.1		35.4	10.6	11.2		7.1	15.7	2.6	3.6	13.7
46013	38.2N	123.3W		10.6	43.2	34.9	11.0	0.3		10.0	3.7	20.1		10.5	13.2	3.6	4.6	26.3
46014	39.2N	124.0W		11.9	39.0	32.4	16.0	0.7		14.1	6.8	11.5		15.1	30.2	4.8	6.2	11.4
46016	45.3N	170.3W		5.3	18.4	46.3	28.3	1.6		8.7	47.2	29.2		10.2	2.0	0.4	0.8	1.3
46017	60.3N	172.5W		2.9	16.4	54.5	23.4	2.9		8.6	20.2	29.3		15.9	10.7	10.1	1.1	4.1
46018	60.3N	177.0W			12.6	58.5	26.4	2.4		18.0	25.9	14.9		12.9	8.0	4.3	3.4	12.6
46019	57.2N	177.7W		7.3	22.4	52.2	15.9	2.0		28.3	19.1	17.0		12.3	12.2	4.9	2.6	3.6
46020	55.9N	168.0W			32.5	45.5	18.7	3.3		21.5	21.5	14.3		13.6	2.6	3.8	3.5	19.1
46022	40.8N	124.5W		4.2	33.8	41.8	18.7	1.5		17.9	7.5	4.5		16.7	36.8	8.9	2.8	4.9
46023	34.3N	120.7W		9.8	25.5	49.3	15.3			30.9	1.8	3.1		10.2	5.7	2.6	2.4	43.2
46024	33.0N	119.2W		19.5	29.9	34.7	15.3	0.6		15.6	9.5	4.2		4.6	4.1	4.7	8.2	47.1
46025	33.8N	119.3W		27.2	41.4	21.5	9.9			9.8	16.1	12.6		8.8	6.8	6.3	8.4	31.3
46026	37.8N	122.7W		9.3	41.7	39.8	9.0	0.1		7.8	17.5	32.4		4.8	11.1	2.7	4.3	19.5

DECEMBER 1982 | % FREQUENCY OF WIND SPEEDS (<4 KTS) | % FREQUENCY OF WIND SPEEDS (4-10 KTS) | % FREQUENCY OF WIND SPEEDS (11-21 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.7W							4.51	0.41						1.61		1.61	6.61		8.21	8.21	0.41	16.81	11.51	1.21	
41002	32.3N	075.7W	0.31	0.11	0.41	0.21	1.11	0.81	0.11		1.81	3.51	4.41	0.11	10.41	4.01	1.61	2.61	6.41	6.91	3.81	4.41	16.51	5.81	2.81	2.71
41006	29.3N	077.3W	0.11	1.71	0.31	0.11	0.81	0.11	0.11	0.41	0.51	1.31	3.71	7.11	4.41	0.41	0.41	2.31	4.31	4.51	19.61	22.71	9.81	1.91	4.71	5.11
42001	25.9N	089.7W	0.11	0.51	1.31	0.21	0.11		0.21	0.71	3.71	2.61	4.31	0.21	0.81		8.91	16.01	6.31	27.91	7.61	2.21	0.91	1.21	0.91	0.41
42002	26.0N	093.5W	0.11	0.41	0.11		0.31			2.01	6.81	2.01	3.21	1.31	0.61	0.41	1.21	10.61	12.51	6.31	15.51	12.91	1.31	0.61	4.31	
42003	26.0N	086.0W	0.81	1.01	1.01		0.31	0.31	0.91	0.81	2.81	1.01	2.81	1.41	1.51	1.11	1.81	1.11	4.71	11.91	21.01	25.31	4.71	1.51	1.61	5.91
42007	30.1N	088.9W	0.31	0.21	0.21	0.11	0.51	0.31	0.51	0.21	2.61	4.71	4.11	5.31	1.51	3.01	1.91	1.71	11.21	14.51	8.71	11.51	2.61	3.71	2.51	5.91
42008	28.7N	095.3W	0.71	0.21	0.31	0.61	0.11		0.41	0.41	2.31	3.01	3.51	3.71	1.31	3.51	1.31	3.11	12.11	8.81	3.01	9.71	7.81	1.31	4.11	6.81
42011	29.6N	093.5W									2.41	4.11	0.81	8.91	1.71	0.11	1.51	0.41	13.41	10.71	2.01	32.71	2.71	1.41	7.41	1.51
44003	40.8N	068.5W	0.11	0.11	0.71	0.61	0.51	0.21	0.91	0.51	3.61	4.31	3.41	3.21	5.91	4.91	4.11	4.61	5.91	3.41	0.21	1.91	11.11	12.01	5.71	11.11
44004	39.0N	070.0W	0.61	0.41	0.91	0.91	0.41	0.41	0.31	1.11	3.61	3.61	2.91	2.31	2.31	3.01	3.51	3.01	10.11	5.31	2.71	1.51	5.31	12.51	8.11	6.01
44005	42.7N	068.5W	0.41	0.71	1.11	0.71	0.81	0.21	0.41	1.91	3.31	1.21	1.81	1.41	0.91	1.81	1.21	4.31	4.31	1.11	1.51	6.51	13.51	11.21	6.51	
44007	43.5N	070.1W	1.61	0.81	0.81	0.41	0.11	0.51	0.61	1.11	4.21	2.01	2.41	1.71	2.11	3.71	4.61	6.81	11.81	4.21	1.41	1.51	2.71	17.21	14.91	6.51
44008	40.5N	069.4W	0.51	0.61	0.21	0.31	0.31	0.61	0.31	0.31	4.21	3.71	3.41	2.81	4.11	2.61	2.31	4.81	6.51	4.11	0.91	2.51	11.91	11.51	6.71	9.81
45002	45.3N	086.7W									9.71	13.91	22.91	27.11	4.21						9.21	6.91		11.11			
45003	45.3N	082.8W												6.71	40.01						35.01	5.01	13.31				
45005	41.7N	082.5W				1.41								13.51	41.21	7.41					3.71	26.31	12.51				
45007	42.7N	087.1W		0.71	0.41		0.51				7.81	11.11	1.61	11.51	12.71	2.01	2.41	3.21	2.41	2.81	2.01	7.81	6.41	5.31	9.11	9.11
46001	56.0N	148.0W	0.11	0.41		0.71	0.81	1.31	0.41	0.21	1.01	2.61	1.31	2.01	3.31	3.41	2.81	2.11	0.11	5.21	8.41	9.21	15.81	11.31	3.41	4.81
46002	42.5N	130.0W		0.41	0.71		0.11	0.11	0.31	2.61	4.31	4.61	1.01	0.91	1.21	1.01	0.91	4.61	9.11	9.11	1.71	10.41	10.71	8.11	5.11	
46003	52.0N	156.0W				0.11			0.31	1.11	0.51	0.51	1.31	2.51	1.51	2.81	3.51	1.91	2.01	1.51	2.81	6.51	10.51	5.31		11.11
46004	51.0N	136.0W	0.11	0.51	0.11	0.21	0.11	0.51	0.11		1.41	0.41	1.61	0.71	3.11	2.11	2.81	3.61	2.71	0.41	1.41	10.01	15.71	9.71	7.71	3.91
46005	46.0N	131.0W		1.11		0.11	0.51	0.31			2.51	2.81	2.41	5.41	3.21	1.41	0.31	3.31	7.71	4.31	0.71	5.51	9.01	9.71	3.11	
46006	40.7N	137.7W		1<.05	0.11					0.91	0.81	0.91	0.81			0.21	0.61	0.31	2.71	3.31	4.91	8.61	9.31	6.51	7.21	3.71
46010	46.2N	124.7W	0.51	0.31	0.21	0.31	0.21	1<.05	0.31	0.31	1.81	5.41	5.51	0.91	0.61	1.61	1.31	3.61	1.21	1.51	7.51	7.41	12.21	2.21	1.51	3.81
46011	34.9N	120.9W	1.91	0.71	2.01	2.41	1.71	1.01	0.21	0.81	9.71	5.11	4.11	0.61	2.31	0.61	1.51	2.71	14.91	6.31	2.41	1.71	4.61	0.31		11.11
46012	37.4N	122.7W	1.41	0.71	2.21	1.71	0.61	0.41	1.31	1.11	15.11	9.21	5.21	2.51	2.01	0.51	1.81	4.21	14.31	9.71	3.71	2.61	7.31	1.41	0.11	2.91
46013	38.2N	123.3W	1.31	1.41	1.91	1.71	0.41	0.71	1.81	1.61	5.81	16.11	7.81	5.01	1.91	1.11	1.41	8.71	2.71	0.71	8.41	3.51	6.81	1.51	1.11	10.21
46014	39.2N	124.0W	2.01	2.31	1.81	1.71	1.31	0.81	1.61	0.91	4.41	4.11	9.41	8.31	6.11	1.51	2.91	2.11	6.11	0.41	0.21	4.91	12.41	1.91	1.61	4.81
46016	45.3N	170.3W		7.71	2.51					1.31	3.71	9.91	4.71				0.41	5.81	19.91	10.81	0.81	1.41	0.41	0.41	1.41	0.81
46017	60.3N	172.3W	1.01	0.21	0.41	0.71	0.61	0.11	0.31		1.71	2.21	3.11	1.81	0.61	0.21		2.81	5.21	10.61	17.51	9.11	4.51	5.41	0.81	1.31
46018	60.3N	177.0W										3.41	3.71	2.21	1.21	1.31	0.41	0.41	12.71	15.11	6.31	2.61	6.41	2.91	2.21	10.21
46019	57.2N	170.3W	0.31	0.91		1.11	2.01	2.11	0.41	0.41	5.31	2.71	4.91	3.01	4.11	0.91	0.81	0.81	17.91	12.91	11.11	4.51	3.01	1.81	0.61	0.51
46020	55.9N	168.0W									7.21	6.91	6.81	2.11	0.81	1.21	1.11	0.31	12.01	12.41	5.61	5.71	0.81	2.01	1.11	9.51
46022	40.8N	124.5W	0.71	1.81	1.61	1.91	0.71	0.61	0.41	0.41	6.81	4.51	2.81	9.31	7.01	1.71	0.91	0.81	7.91	2.21	0.11	5.41	17.11	5.41	1.41	3.11
46023	34.3N	120.7W	1.91	0.91	1.21	1.11	0.71	1.01	1.31	1.71	5.81	0.61	1.71	5.81	1.91	0.71	0.91	8.21	17.31	0.31	0.31	3.41	3.11	0.31	0.11	24.61
46024	33.0N	119.2W	1.71	0.71	1.21	1.11	1.51	1.71	5.91	5.61	7.11	2.01	1.61	3.21	2.11	1.01	2.11	10.01	5.91	4.61	0.61	0.21	0.51	2.61		20.11
46025	33.8N	119.3W	2.21	2.31	4.31	4.31	3.61	3.11	2.81	4.71	2.71	6.11	7.61	4.41	2.21	1.51	3.91	12.81	4.21	5.51	0.51	0.21	1.01	1.31	1.71	7.11
46026	37.8N	122.7W	2.51	2.41	2.31	0.11	0.11		0.51	1.31	2.01	8.01	20.11	1.61	0.71	0.81	2.61	5.81	3.11	0.71	10.01	2.91	6.81	1.71	0.61	8.11

DECEMBER 1982 | % FREQUENCY OF WIND SPEEDS (22- 33 KTS) | % FREQUENCY OF WIND SPEEDS (34-47 KTS) | % FREQUENCY OF WIND SPEEDS (>47 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.7N	072.7W		7.41	2.51		20.91	10.21																		
41002	32.3N	075.7W	3.61				2.81	1.71	1.31	2.11																
41006	29.3N	077.3W	0.21				0.11	1.81	1.41	0.91																
42001	25.9N	089.7W	3.41	1.31	0.21	0.41	0.21	0.11	0.11	0.71																
42002	26.0N	093.5W	2.51	2.11	0.21	6.41	4.11		0.11	1.31																
42003	26.0N	086.0W		2.61	1.51					1.01																
42007	30.1N	088.9W	0.11	<.05	0.61	0.11				1.51																
42008	28.7N	095.7W	5.21	4.51	0.51	1.61	0.11		0.41	2.31																
42011	29.6N	093.5W	0.81	2.21	3.11	1.61			0.61																	
44003	40.8N	068.5W	3.21	4.61				0.71	0.21	0.21																
44004	39.0N	070.0W	5.91	4.11			2.31	1.21	2.71	3.21	0.11	<.05														
44005	42.7N	068.5W	5.71	8.11	0.51	0.81	4.11	9.91	1.71	3.01	0.11															
44007	43.5N	070.1W	1.01	<.05			0.91	0.91	0.51	0.91																
44008	40.5N	069.4W	4.81	4.91			0.41	0.91	1.51	1.51	0.71	0.11														
45002	45.3N	086.7W																								
45003	45.3N	082.8W																								
45005	41.7N	082.5W																								
45007	42.7N	087.1W							1.11																	
46001	56.0N	148.0W		0.81	4.81	4.61	9.01	0.81	0.21																	
46002	42.5N	130.0W			0.41	1.31	5.61	4.71								0.51	0.11									
46003	52.0N	156.0W	1.61	2.81	4.41	4.11	6.01	5.91	16.11	8.11	0.81	0.81	0.11	1.41	2.01	0.61	0.81	0.81								
46004	51.0N	136.0W	0.41	0.11	0.31	7.11	9.51	4.31	5.81	2.01	0.11	0.21	0.11	0.51				0.31								
46005	46.0N	131.0W		3.81	2.01	0.41	5.31	11.01	9.51					0.81	1.01	0.61	1.61								0.31	
46006	40.7N	137.7W	0.31	1.51	2.21	5.01	9.91	9.21	12.11	2.81					0.41	2.51	2.81	0.31							0.31	0.21
46010	46.2N	124.2W				0.61	7.41	5.41	0.11						0.31											
46011	34.9N	120.9W	1.41					0.81	0.21	5.51							0.11									
46012	37.4N	122.7W	4.61	1.01	0.11	0.41	5.61	0.11	0.41	5.51																
46013	38.2N	123.3W	0.21			0.31	4.21	0.31	0.31	5.61								0.31								
46014	39.2N	124.0W	1.61			0.61	10.01	0.61		5.31					0.31			0.41								
46016	63.3N	170.3W	1.51	19.31	6.01	1.01	0.31			0.11		0.81		0.81												
46017	60.3N	172.3W	0.61	5.61	8.01	4.11	4.61	0.41				1.61	0.31	0.61	0.31											
46018	60.3N	177.0W	5.31	7.41	4.21	6.41	0.41		0.71	2.01			0.81	1.61												
46019	57.2N	170.3W	4.81	2.21	1.01	3.01	2.81		0.71	1.41		0.41		0.81	0.41			0.41								
46020	55.9N	168.0W	2.31	2.21	1.91	4.21	1.01	0.51	1.21	5.31				1.61				1.61								
46022	40.8N	124.5W	2.41	<.05			10.51	1.21	0.11	0.61					1.51											
46023	34.3N	120.7W	8.91	0.11				0.61		8.81																
46024	33.0N	119.2W	0.81	2.21	0.71			0.51	0.21	10.81								0.61								
46025	33.8N	119.3W	0.41	2.21				0.41		6.61																
46026	37.8N	122.7W	0.21	0.31		0.11	3.51	0.21	0.41	4.21								0.11	<.05							

LETTER TO SHIP CAPTAINS FROM THE ADMINISTRATOR, NATIONAL WEATHER SERVICE

UNITED STATES DEP. ‹TMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
Silver Spring, Md. 20910

MAY 18 1983

W/OTS21x2:JWN

Dear Captain:

This letter is important to the safety of your ship. Please be sure your watch and radio officers also read it.

The hurricane season commences June 1 and runs through November 30. At National Weather Service Offices and the National Hurricane Center special programs are set into motion to improve your safety. You can assist us as follows:

1. When within 300 miles of tropical storms or hurricanes, transmit weather observations at least every 3 hours. Hourly reports when within the storm would be very beneficial if routine permits.

2. In the "Remarks" section of the Ship's Weather Observations NOAA Form 72-1A (also called the log or record) and in the weather message transmitted by radio, include the lowest pressure and/or the highest wind encountered since the last synoptic (0000, 0600, 1200, or 1800 GMT) report, if:

   a. The pressure was more than 5 millibars lower and/or,

   b. The wind was more than 15 knots higher than the last report. Include the time of occurrence in the radio message and on the record.

3. Use the prefix "STORM" on the weather message. If you are in a named tropical storm or hurricane use the name in remarks. Example of radio message:

   STORM (standard weather report) JOHN 1305Z LOWEST PRES 955MB 1240Z HIGHEST WIND 80 KTS GUSTS TO 100 KTS.

The position on each weather report automatically updates your AMVER position making it infinitely easier to find your ship and give assistance, if required.

The weather observations from your ship and the other ships in the worldwide volunteer observing programs provide the basis for weather, tropical storm, and hurricane forecasts over the oceans. Thank you for your past efforts and please continue them into the future. I wish you a safe hurricane season.

Sincerely,

for Richard E. Hallgren
Acting Assistant Administrator
for Weather Services.

Enclosure

GENERAL INSTRUCTIONS

AMVER and USMER Messages

AMVER and USMER messages can tie up radio stations during the regular weather reporting hours of 0000,0600, 1200, and 1800 GMT. Try to avoid sending AMVER or USMER messages from one-half hour before to 2 hr after the main synoptic hours. Remember, your weather report updates your ship's position.

SITOR or CW Weather Reports Through the U.S. Coast Guard

U.S. Coast Guard radio stations are the first choice for weather message relay, and we request that properly equipped ships attempt contact on two different frequencies before shifting to other choices of transmission. It is sufficient to identify the weather message as "OBS" or "METEO" and then proceed with the message commencing with the radio call sign, or STORM, if appropriate.
The message preamble and "OBS METEO WASH DC," which are not passed, are unnecessary and delay the report.
Example: "STORM CALL YYGGiw 99LaLaLa, etc..."

INMARSAT (MARISAT, COMSAT) Weather Reports

Ships equipped with INMARSAT communications systems as a primary means of communication may transmit weather reports via the U.S. Coastal Earth Stations. They should use the Telex No. 230 89406. This number is also the address, so "OBS METEO WASH DC" should not be used. NWS will accept charges to this number for weather reports if you are either in the Pacific Ocean north of the Equator and east of the dateline, or in the Atlantic ocean north of the Equator and west of 35°W longitude, including the Gulf of Mexico and Caribbean Sea. There was an error in earlier billing, which has been corrected. No ship or company is ever charged for sending a weather report using the specified procedures.

SITOR or CW Weather Reports Through Specified U.S. Commercial Radio Stations

In the event that a ship cannot contact the U.S. Coast Guard and does not have INMARSAT, a third priority choice is available through U.S. commercial radio stations specified in the publication "Radio Stations Accepting Ships' Weather and Oceanographic Observations." The ships must be in the U.S. forecast areas and the message must be transmitted within 3 hours following the synoptic hour. Starting with the preprinted 99 indicator, commercial radio weather reports will be sent in 10-character groups.

Single Sideband (Radiotelephone) Voice Weather Reports

If none of the above methods are available single sideband voice (radiotelephone) may be used to report to selected U.S. Coast Guard radio stations. This method may be used for transmitting weather reports if radiotelephone is available on the bridge and the radio shack is secured. The procedures are exactly the same as CW weather reports except the numbers are spoken.

National Weather Service (NWS) Forecast Areas

Western North Atlantic including the Gulf of Mexico and Caribbean Sea north of 3°N latitude (observations from Equator) and west of 35°W longitude (WMO Region IV-A).

Eastern North Pacific, north of the Equator and east of the 180th Meridian (WMO Region IV-A).

Eastern South Pacific, south of the Equator from South America coast to 120°W longitude (WMO Region III-B).

Guam

Western North Pacific between 5°N and 25°N latitude and from 135°E longitude to the 180th Meridian (WMO GUAM ZONE).

WE OF NOAA ARE MAKING USE OF THIS SMALL AMOUNT OF SPACE TO EXTEND OUR THANKS TO ALL THE SHIPS' OFFICERS WHO ROUTINELY TAKE SHIPBOARD WEATHER OBSERVATIONS. TO US, THESE EXCELLENT OBSERVATIONS ARE PRICELESS. WE CERTAINLY DO APPRECIATE RECEIVING THEM REGULARLY.

Inside Back Cover.--A dock worker at Dartmouth, Nova Scotia rows his boat through heavy fog to a wharf. The towering superstructure of the oil rig JOHN SHAW cuts through the fog. Wide World Photo.

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